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PCir A Second Look
at the Machine
and Its Software

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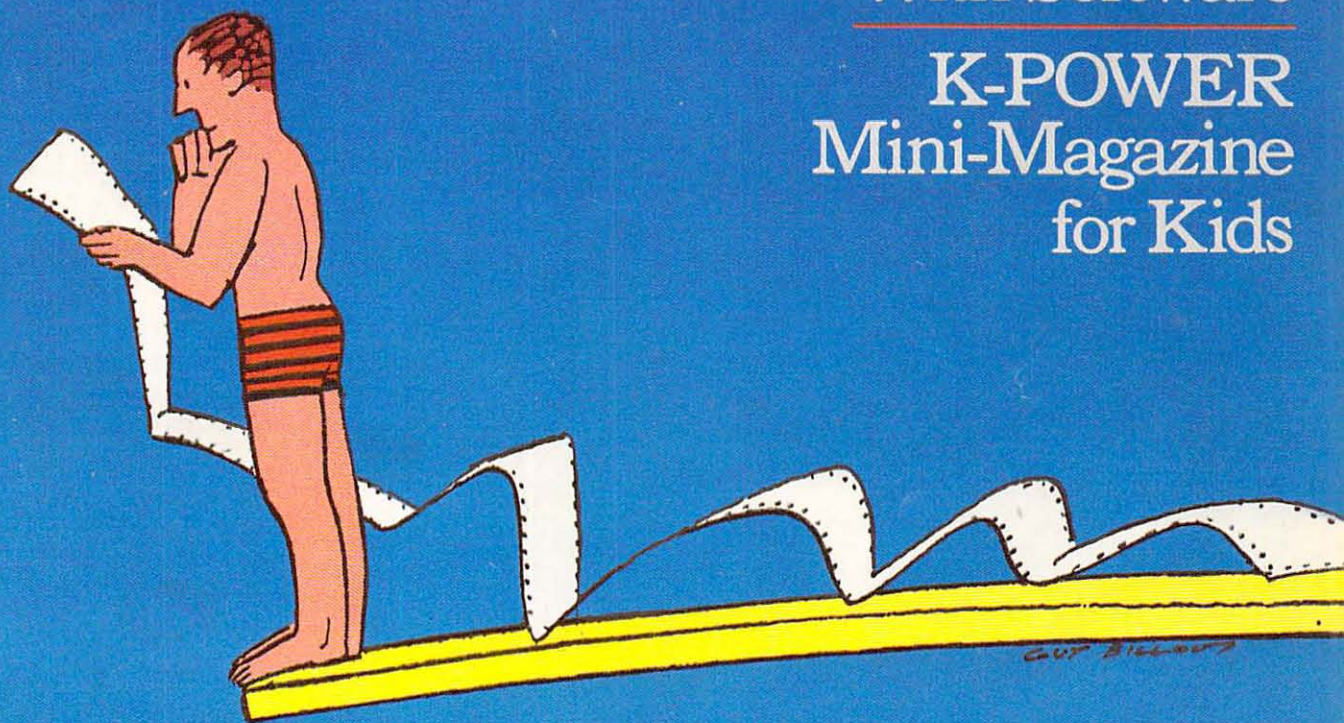
FAMILY COMPUTING

**Spreadsheets
at Home:**
New Tools for
Decision-Making

**Buyer's Guide
to Portable
Computers**

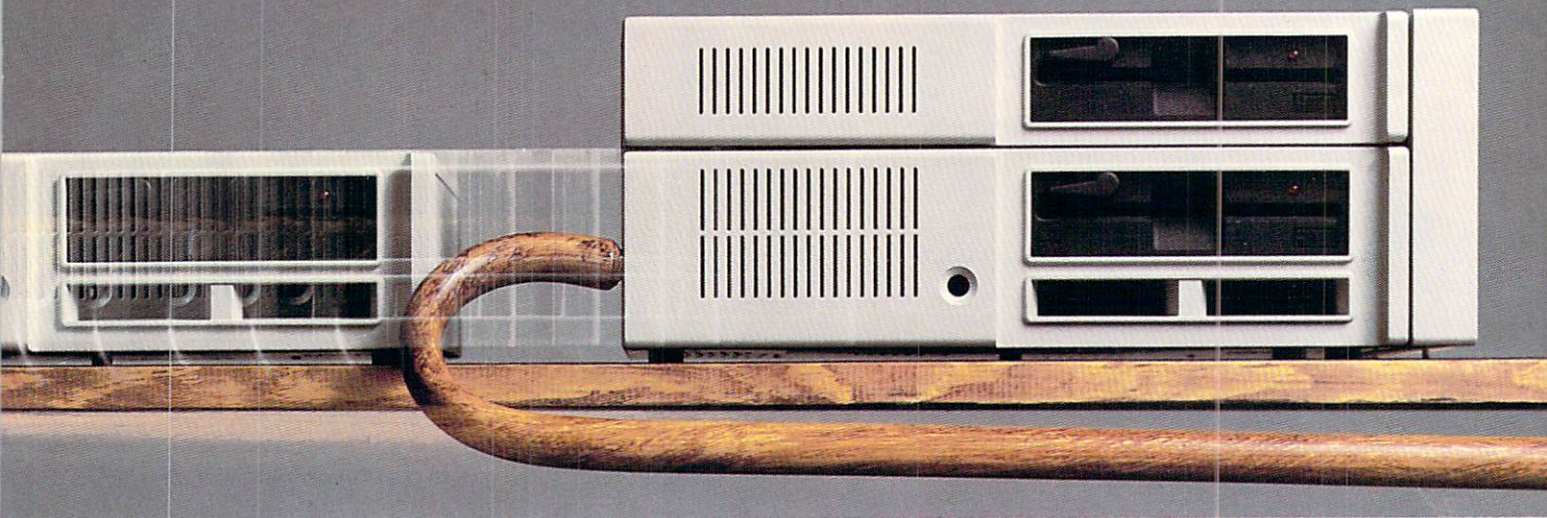
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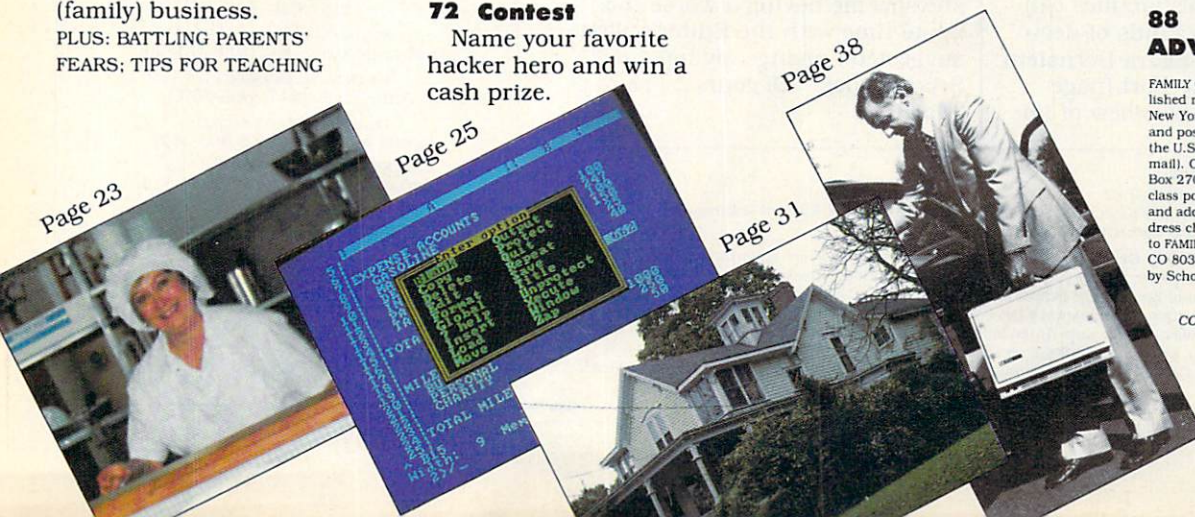
A monthly cartoon.

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COVER ILLUSTRATION BY GUY BILLOUT



EDITOR'S NOTE

A SECOND LOOK

Being stubborn seldom works in my favor. I'm embarrassed to admit how pigheaded I can be when someone proposes a change. "No!" is my usual response. Then, after some time passes, my mind opens, followed by my mouth, and a little voice can be heard admitting, "I've been thinking about what you were saying this morning (or yesterday, or last week, or an hour ago), and it sounds like there's something there." It's so easy. After a second look.

Several of the articles in this issue involve taking a second look. The most obvious is our "re-review" of IBM's PCjr (page 42). When the machine first was released, it received poor reviews from the press, but more important, it was ignored by most of the buying public. IBM deserves credit for its response to this reaction. It took a second look, and instead of retreating from the market, it improved the machine and offered a deal that neither retailers nor consumers could resist. We all know what happened then—jr took a big step on its own and became a sensation of the holiday season. As a result, we decided it was time to give our readers a second look at the machine and its software.

This success of the PCjr—and of the Apple IIc—has led industry watchers to reappraise the way families are using computers in their homes. All of a sudden, these "experts" realized that hundreds of thousands of families were joining the millions who were already deeply committed to computing at home and to serious applications.

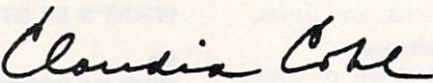
On second look, the spreadsheet, a standard fixture in businesses of all sizes, is being recognized as one of the most effective tools families can use for making many kinds of decisions. Senior Editor Laura Bernstein has crafted a special report (page 23) that includes an overview of im-

portant uses for spreadsheets at home, reviews of major programs available for most computers, and one woman's detailed account of how spreadsheets can help prospective home owners. Invaluable help in compiling this section came from Researcher Linda Williams, Technical Director Lance Paavola, Contributing Technical Editor Joe Gelman, and Reviews Editor John Wallace.

In many homes, parents are taking a second look at their computer-literate children. Instead of shaking over the fact that their kids know more than they do about something, they're using that knowledge as an asset in computerizing a family business. Senior Editor Anne Krueger spoke with some of these kids and their families, and reports on her findings in "Biz Kids," page 35. Don't miss the guidelines for parents and kids who want to follow this same path.

You might also want to take a second look at the small portables that many people are finding indispensable as a second computer that can be carried anywhere. Be sure to read our Buyer's Guide to Portables (page 38).

The important part of all this is to keep yourself open to new ideas. You are, I know. After all, being open is what it took to become a computer owner in the first place.



CLAUDIA COHL
EDITOR-IN-CHIEF

P.S. Special thanks to Managing Editor June Rogoznica, who, when she saw me having a worse-than-usual time with the Editor's Note, suggested I change my topic to "A Second Look." Of course, I said "No!"

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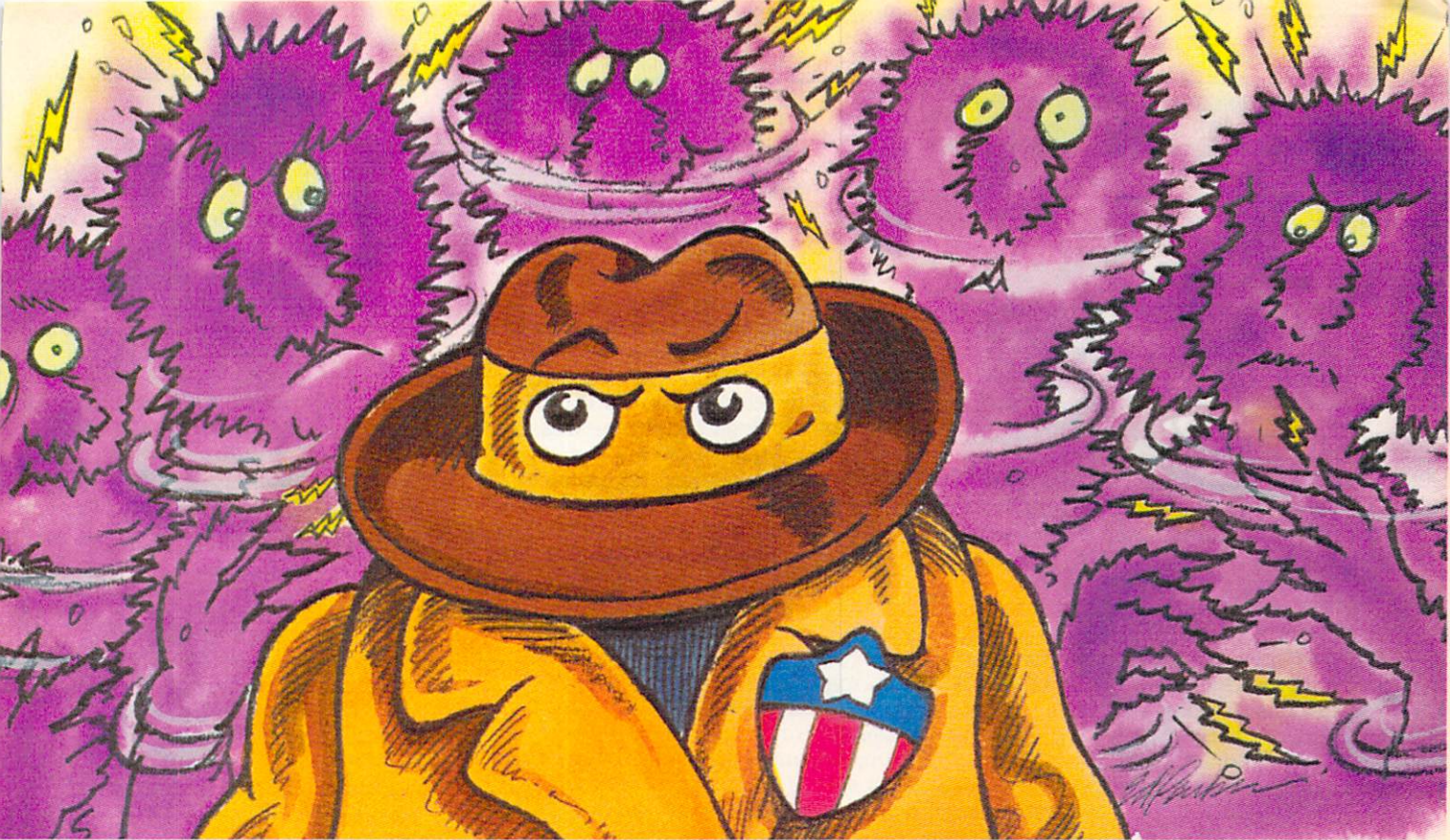
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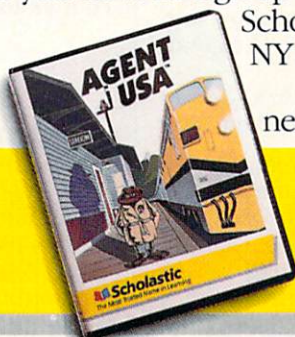
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LETTERS

FAMILY NEEDS

Your magazine is the best thing I've found for computer beginners. My oldest daughter is developing most of her computer interest from your magazine, and my 4-year-old loves to find pictures of the software that "looks fun."

I did a lot of research on home computers before buying one, and found the Commodore 64 to have the best combination of price and software availability. I have been very satisfied, but do have one complaint. I find it very tedious working with a lot of numbers on the Commodore. Could you please tell me if Commodore has any plans to make a keypad for the 64? It's a great computer, and a keypad would make it nearly perfect for my family's needs.

JUDY LANDRY
Thibodaux, Louisiana

EDITOR'S NOTE: Since Commodore recently introduced the 128 computer with a built-in keypad, it's unlikely that the company will develop a separate keypad for use with the C64. Our research department tried to track down keypads available from other companies and found only two. A numeric keypad, the CK/1 (\$49), is available from Cardco, 300 S. Topeka, Wichita, KS 67202; (316) 267-6525. For youngsters, the Muppet Learning Keys (\$79.95), which has alphabet and number keys, comes from Koala, 3100 Patrick Henry Drive, Santa Clara, CA 95052; (800) KOA-BEAR.

SEEKING IIc INFO

I am a new subscriber, and I find FAMILY COMPUTING a very interesting computer magazine. I would appreciate it if you would let me know where I can find some information about the Apple IIc computer. I plan to buy one, and I want to get as much information as I can about it.

MARYLEEN OSBORNE
Sparta, Georgia

EDITOR'S NOTE: For more information on the Apple IIc, you should write to Apple Computer, Inc., 20525 Mariani Ave., Cupertino, CA 95014; or call (800) 538-9696.

A NEGLECTED JUNIOR?

I recently ordered an IBM PCjr and, while I am anxiously waiting for it to arrive, I am reading up on different ways to use it. I was disappointed in

two of the articles in your December 1984 issue. In one article you reviewed more than 15 art programs, and yet you did not mention ColorPaint for the PCjr. I was also disappointed to see that an IBM PCjr version of Home on the Range was not included. I had heard many positive comments about the musical capabilities of the advanced jr so I was hoping that I would be able to check them out using your program. Keep up the good magazine, but please don't neglect us jrs.

TERRY CARNES
Yukon, Canada

EDITOR'S NOTE: Sorry we disappointed you. We did publish a review of ColorPaint, however. It appeared in the February issue of the magazine as part of a roundup on software requiring a mouse or other alternative input devices. (See "Buyer's Guide to Keyboard Alternatives," page 47.) For more information on the IBM PCjr, check out the feature on page 42 in this issue. You are correct. The PCjr does have good music capabilities. Unfortunately, we had to cut the IBM PCjr version of Home on the Range due to space limitations.

AN UNHAPPY VIEWER

I'm writing to tell you how much I've enjoyed watching your TV show and reading your magazine. But recently, in the Cable Guide, I read that Lifetime is moving your show from 8:30 p.m. to 10:30 a.m. (EST) on Tuesdays and Thursdays. Because of the change, I can no longer watch your show. Fewer people will be able to watch it anyway because they're in school or at work. At 8:30 p.m., people are at home watching TV.

I know my letter won't make much of a difference, but I was hoping you could somehow convince Lifetime to keep FAMILY COMPUTING in its original time slot. You have a great show and a great magazine. Keep up the great work.

ADAM NEWMAN, age 14
Suffern, New York

EDITOR'S NOTE: Unfortunately, we at the magazine have no control over the hours Lifetime chooses to run our show. We hope, however, that some of our readers will be able to tune in to the show on their days off work or school. If you or your friends have a video cassette

recorder, you can always record the show and play it back later. The show's hours are subject to change, so check your local TV listings for details. The FAMILY COMPUTING TV Show is presented on the Lifetime cable television network. The show presents 30 minutes of product demonstrations and helpful tips to make computing life a bit easier for the entire family.

TO THE RESCUE

I read the article about computer care in the February issue. Two days later my disk drive started erasing disks. Your magazine was a tremendous help in pinpointing the problem. Thanks to your magazine, I didn't have to get my disk drive repaired. Thanks so much for your help!

STEPHEN SASSMAN
New Braunfels, Texas

EDITOR'S NOTE: We're glad you found the February cover story, "A Step-by-Step Guide to Computer Care," useful. However, we want to emphasize one important step: If you plan to open your computer, be sure to turn it off and unplug it. If you have a built-in monitor, then it's better not to open your computer at all, because monitors contain capacitors that store potentially dangerous electrical charges... even after the machine is turned off.

"ANCIENT-BUT-AWESOME"

I am the proud owner of an Atari 800, an ancient-but-awesome computer. With all the new computers coming out, I feared that Atari was soon to be lost. But thanks to your article on the new owner Jack Tramiel and the lists of available software, I have new hope for Atari. Thanks for the lift in spirit.

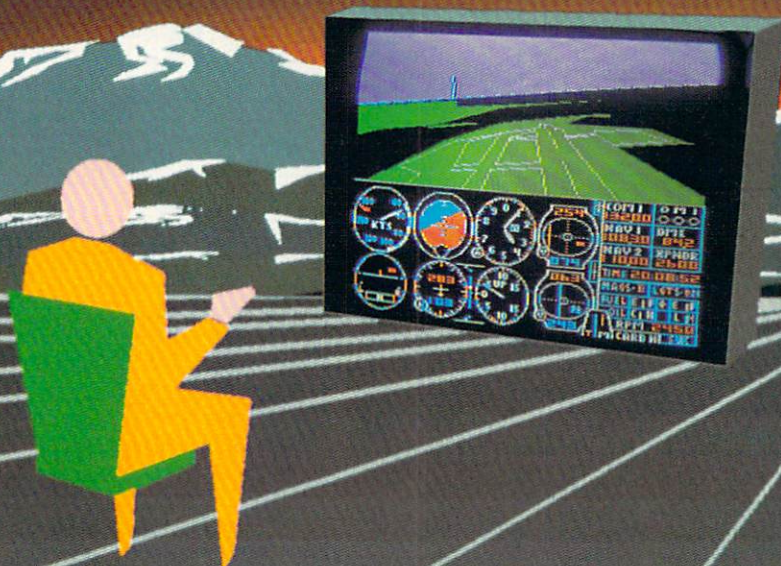
TOM SALEMI
Revere, Massachusetts

CORRECTION

Due to a printer's error, we listed incorrect phone numbers for three manufacturers in our Guide to Color Printers (April issue, page 45). The correct telephone numbers are: Apple Computer, (408) 996-1010; Axiom, (818) 365-9521; and Radio Shack, (817) 338-2395.

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BEHIND THE SCREENS

PEOPLE, NEWS, AND TRENDS

EDITED BY JUNE ROGOZNICA

FAMILY COMPUTING Goes to Washington

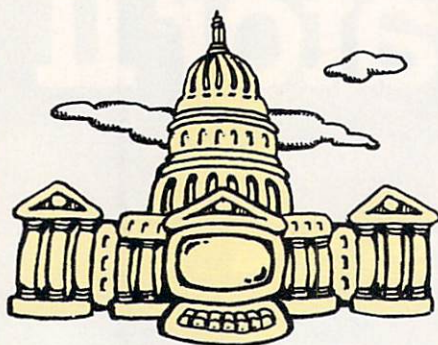
White House officials invited a select group of "hi-tech" journalists and publications—including FAMILY COMPUTING—to Washington, D.C., for a day-long briefing on how technological advances are affecting government policy. Here are some highlights:

WILLIAM WEBSTER, director of the FBI, said that teenage hackers who wreak havoc by breaking into private or government computer systems are not a major crime problem. In fact, these techie teenagers are not even the target of any special FBI investigations. "White collar" computer crime is more widespread, Webster said. White collar criminals use the computer as an instrument—like a gun—to commit old-fashioned crimes such as fraud, embezzlement, theft, etc. The average dollar value of these crimes is about \$500,000.

The FBI is becoming more and more dependent on computers. More than 17 million fingerprint records are stored on computers. And computers with lasers can identify fingerprints on the inside of a glove or on Styrofoam cups.

MALCOLM BALDRIDGE, secretary of commerce, said that the United States cannot, and will not, let another nation take the lead in technology development. Baldrige said that U.S. scientists are producing computers that operate two to three times as fast as Japanese computers. He also said that while the Japanese are "doing a good job of catching up," the United States is "way ahead" in one- and four-megabyte RAM chips, logic design, and central-processor design. More simply stated, U.S. technology can produce more powerful and/or smaller computers than the Japanese.

JAMES BEGGS, administrator of NASA, said that Americans have "exchanged a love of autos for a fascination for computers." And he said that computer technology developed for space exploration has resulted in 13,000 applications in the medical field. One of the most significant is the PIMS computer, used in the Viking's expedition to Mars. It's a



small pump that can reside inside a person, with a programmable computer that will dispense drugs on schedule. With a 6K memory, and a 10-year battery, PIMS has the same computing power the 32-megabyte IBM 7094 had 10 years ago. PIMS is now being implanted in cancer patients to dispense morphine. Because it can direct the drug to the right spot, a smaller dose is needed. Soon it will be used for diabetics, says Beggs.

The White House has gone on-line, with the White House News Service (WHNEWS). It's menu option number 52 on ITT's Dialcom information service. This wire service is updated daily by the White House Office of Media Relations, and includes full text of news releases, speeches, personnel appointments, legislation, disaster statements, and other public information.

—NICK SULLIVAN

Cashing In on a Computer Career

Thinking of a career in the computer field? If not, maybe you should. Salaries for most hi-tech jobs continue to increase more rapidly than in other fields, according to a recent survey by Source Services Corp.

Source, one of the largest recruiting firms for the computer profession, interviewed about 48,000 employees and 25,000 organizations for its 1985 Computer Salary Survey and Career Planning Guide. The survey lists median salaries for professionals with between two and seven years experience in the microcomputer field. In nonmanagement positions, salaries ranged from \$20,500 for computer operators to \$32,400 for machine programmers, with senior analysts, project leaders, and consultants topping off the cate-

gory at \$39,100. In the management category, salaries for medium-size companies ranged from \$39,300 to \$56,900. Sales personnel took home the largest chunk of the pie, with hardware and software representatives earning up to \$55,400, and sales managers grossing \$67,700.

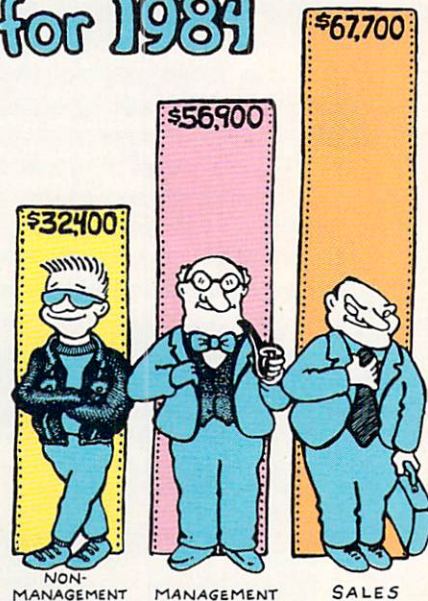
If you still aren't convinced which job is the best for you, let your computer crunch these numbers: Sales managers' salaries increased 22.4 percent from the previous year while microcomputer programmers' salaries rose only .3 percent.

How do these raises stack up against those of other professionals? Sibson, a consulting firm in New Jersey, surveyed 875 companies across the nation in 1984, and found that salaries in general rose only 6.6 percent from 1983. The logical deduction, according to David Grinnell, a vice president at Source Services, is that in most areas "the computer industry is still outpacing the general economy."

Computer professionals can obtain free copies of Source's survey by writing Source Edp, Dept. DX-25, P.O. Box 7100, Mountain View, CA 94039. Be sure to enclose your business card.

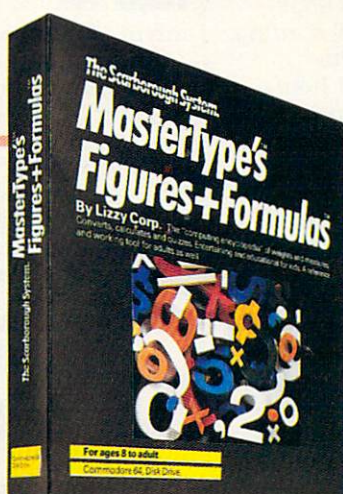
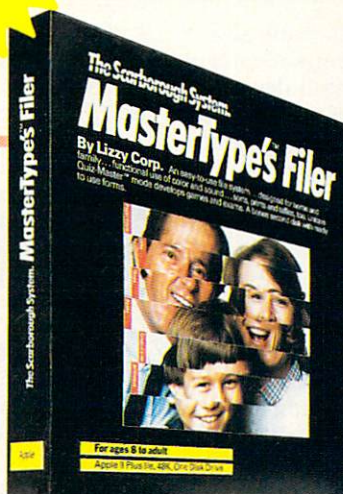
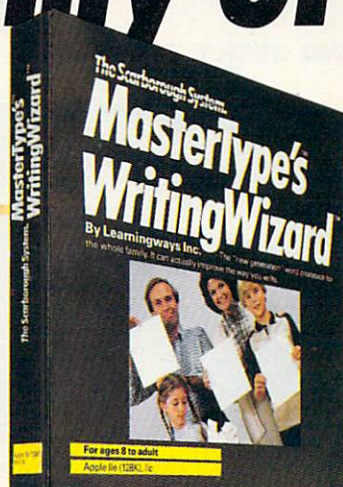
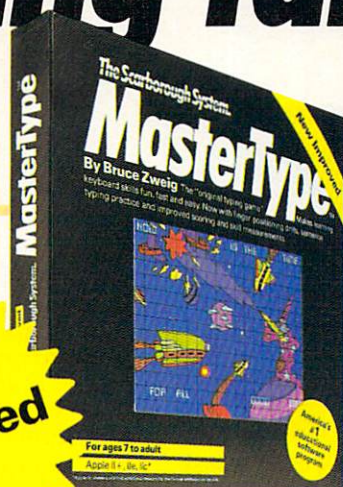
—LINDA WILLIAMS

Top Salaries for 1984



ILLUSTRATIONS BY HOLLY KOWITT

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HOME-SCHOOL CONNECTION



THE ABCs OF READING-SKILLS SOFTWARE What You Need to Know to Make the Right Purchase

BY MINDY PANTIEL AND BECKY PETERSEN

ISSUE	TOPIC
April	Introducing skill-building software
May	Software for reading skills
June	Software for writing skills
July	Software for math skills

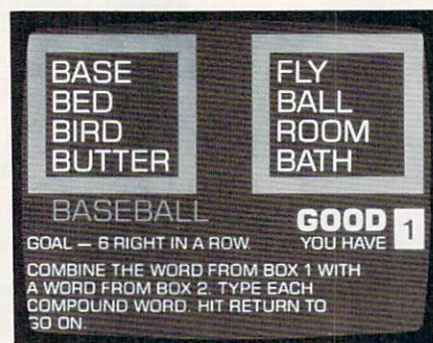
This is the second in a four-part series about software to help your child with the basic skills—reading, writing, and arithmetic. This month, we'll take a look at how software can help build reading skills.

Nothing is more important in a child's education than learning to read. Parents and teachers alike recognize that it's crucial to a child's ability to get along in the world at large, as well as in school.

You'll find a number of software packages for improving reading skills at home. The computer is especially suited to drilling students. Immediate feedback lets kids see their progress in an area right away. But remember, learning to read is a many-tiered process. And using a computer to learn at home is not for everybody. Because they're not games, some of these programs may call for some parental encouragement.

Before you initiate a software search, map out the territory. Depending on age and skill level, your child will have different needs.

"The goal of all reading instruction is comprehension," says Kathleen Madigan, an elementary-school principal in Denver, Colorado. The aim should be "to help youngsters develop the skills and abilities to extract the meanings, feelings, moods, and



Learn About Words in Reading, from American Educational Computer, focuses on structural-analysis skills.

intent of written words," she says.

Learning to read means mastering four basic strands of skill development: reading readiness, vocabulary development, structural word analysis, and reading comprehension. Though they're all interconnected, each phase requires a different teaching approach and, as a result, different kinds of software.

GETTING READY TO READ

The process of learning to read begins well before kids enter school. Identifying letters and numbers, differentiating between shapes, and training the eye to move from left to right and from top to bottom are some of the most important "reading-readiness skills."

When software manufacturers describe the educational content of a piece of software for young children, they frequently list "pattern recognition" or "shape discrimination" among its benefits. These are reading-readiness terms—describing skills that prepare prereaders for more formal reading instruction.

These skills can flourish without the aid of the computer at home. Big picture books, puzzles, and toys serve the cause well, with plenty of help from mom and dad. But home software, if it's stimulating and easy to use, can help considerably.

Preschool teacher Karin Borgh recommends *Alphabet Beasts and Company* (Software Productions, for Apple II series). High-resolution

graphics draw the child's attention to the shape of the letter or number. Characters, including dragons and unicorns, illustrate each letter, which is accompanied by a rhyme.

Borgh recommends programs geared to several reading-readiness skills rather than just one. You get more for your money and many more options for your child to choose from—a little extra insurance against disuse.

She views *Early Games for Young Children* (Springboard Software, for Apple II series, Atari, C 64, IBM PC/PCjr) as one of the better packages for preschoolers. Featuring letter-, number-, and shape-recognition activities, and very simple counting tasks, the games are easy to use and inviting.

LEARNING NEW WORDS

Reading relies on the use of a "sight vocabulary"—an ever-expanding collection of memorized words. Kids must learn how to recognize words, as well as learn what they mean. In secondary school, older students continue to add to their vocabularies words related to classwork. The college-entrance exams test the depth of students' sight vocabularies.

No matter what the age or grade level, everyone encounters new words. "Vocabulary games can be very beneficial in broadening and improving vocabulary," says Sue Ridgely, an elementary-school reading teacher. "But make sure that the learning aspects of the program don't get overshadowed by the game-playing features," she adds.

Ridgely finds *The Game Show* (Advanced Ideas, for Apple II series, C 64, IBM PC/PCjr) good for assisting vocabulary development. She likes its gameshow format: one person or team giving clues, the other

Contributing Editors BECKY PETERSEN and MINDY PANTIEL have written extensively about computers, kids, and learning.

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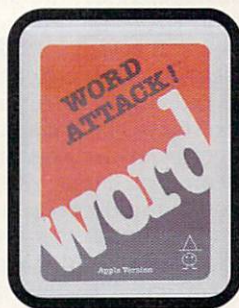


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guessing and spelling the word correctly in order to win. Ridgely recommends it for kids in grades three to six. You can add your own words too, a factor that greatly enhances its value.

Another vocabulary builder recommended by teachers is *Word Attack* (Davidson & Associates, for Apple II series, C 64, IBM PC/PCjr). Word lists accompanied by drill exercises and an arcade game make for a complete package. Add your own personalized word lists or use one of the disks available at extra cost for different reading levels, or college-entrance exam preparation.

Riddle Me This (Data Command, for Apple II series, TRS-80 Model III) is a top-rated set of programs that transforms your computer into a "riddler." Kids are challenged to solve a riddle and identify a contraction, homonym, or possessive form of a noun located in the puzzle (depending on which of the three programs you use).

For the teenagers in the house, *Analogies: Challenges in Meaning and Order* (Micro Power & Light, for Apple II series, IBM PC/PCjr) will help out with college-entrance test preparation. More than 100 analogy exercises are presented in these categories: synonyms and antonyms, geometry, cause and effect, comparisons, and degrees. Its multiple-choice format is similar to most test structures, and the program gives feedback. The main purpose is to expand vocabulary.

FIGURING OUT NEW WORDS

While a constantly evolving sight vocabulary is essential to being a good reader, children also need to develop skills which help them figure out words they've never seen before. In education, this is called structural analysis.

Remember the phonics you practiced in grade school? You had to sound out words based on vowels, consonants, and blends. This is decoding training, one part of structural analysis.

Many schools still use the phonics approach today; however, there are many other structural analysis skills to learn as well. The role of abbreviations, contractions, compound words, plurals, prefixes, suffixes, synonyms, antonyms, and homonyms must be understood. Context clues and knowing how sentences are phrased to figure out the meaning of new words are also important aspects of learning to read. The list

READING SOFTWARE REPORT CARD

Here's a guide to help you focus on the features to look for when choosing reading-skill software for your children.

Grade a package before you buy it. The more Yes boxes you check for each type of program, the better.

READING-READINESS PROGRAMS SHOULD:

Yes No

Help children identify letters and shapes—first individually, then in sequence.

☐ ☐

Help children learn to discriminate between different shapes and colors, and whether or not items fit into a pattern.

☐ ☐

Present a variety of activities.

☐ ☐

Be easy enough to use so children can make decisions on their own.

☐ ☐

VOCABULARY-BUILDING PROGRAMS SHOULD:

Yes No

Provide a variety of levels, progressing from easy to more difficult.

☐ ☐

Help children recognize the word *and* understand its meaning.

☐ ☐

Enable parents to add new lists.

☐ ☐

Include word lists in documentation.

☐ ☐

STRUCTURAL-ANALYSIS PROGRAMS SHOULD:

Yes No

Give practice in sounding out words based on consonant and vowel sounds.

☐ ☐

Give practice with letter blends such as "th," "sh," "oo," and "bl."

☐ ☐

Give practice with word structures such as prefixes, suffixes, plurals, compound words, and contractions.

☐ ☐

Give practice with synonyms, antonyms, and homonyms.

☐ ☐

COMPREHENSION PROGRAMS SHOULD:

Yes No

Give practice using context and syntax clues to figure out meaning.

☐ ☐

For later grades, give practice classifying words, finding story details, putting events in order, recalling key facts and ideas.

☐ ☐

In later grades, give practice drawing conclusions, making inferences, and evaluating written material.

☐ ☐

SPELLING PROGRAMS SHOULD:

Yes No

Present a wide variety of words to learn, progressing from easy to more difficult.

☐ ☐

Give students a strong visual image of a correctly spelled word.

☐ ☐

Enable parents to add new lists.

☐ ☐

Include word lists in documentation.

☐ ☐

of interrelated skills is extensive.

Software that develops the full body of structural analysis skills at home is rare. Some schools employ programs in their reading curriculum—large-scale, expensive affairs using many disks and extra materials.

For home help in this area, there are a few good programs parents can turn to: *Reading Keys* (Avant-Garde Publishing, for Apple II series) is a simplified version of the school-reading program PAL (Personal Aid to Learning). With packages for different reading levels, *Reading Keys* comes with a "Discovery Disk," which evaluates reading ability with a test that moves the child to higher or lower levels of questions. The "Learning Disk" then gives instruc-

tion and practice in 15 to 20 major skill areas targeted for the specific reading level. Exercises cover vocabulary, structural analysis, comprehension, and study skills. The program lets you know when a child can move up a reading level.

Learn About Sounds in Reading (American Educational Computer [AEC] for Apple II series, Atari, C 64, IBM PC/PCjr, TRS-80 CoCo) tackles beginning phonics. It introduces the sounds of short vowels, long vowels, and beginning consonants. Another program in this company's "Easy Reader" series, *Learn About Words in Reading* (same machines), emphasizes the structure of words by covering prefixes, suffixes, contractions, and synonyms.

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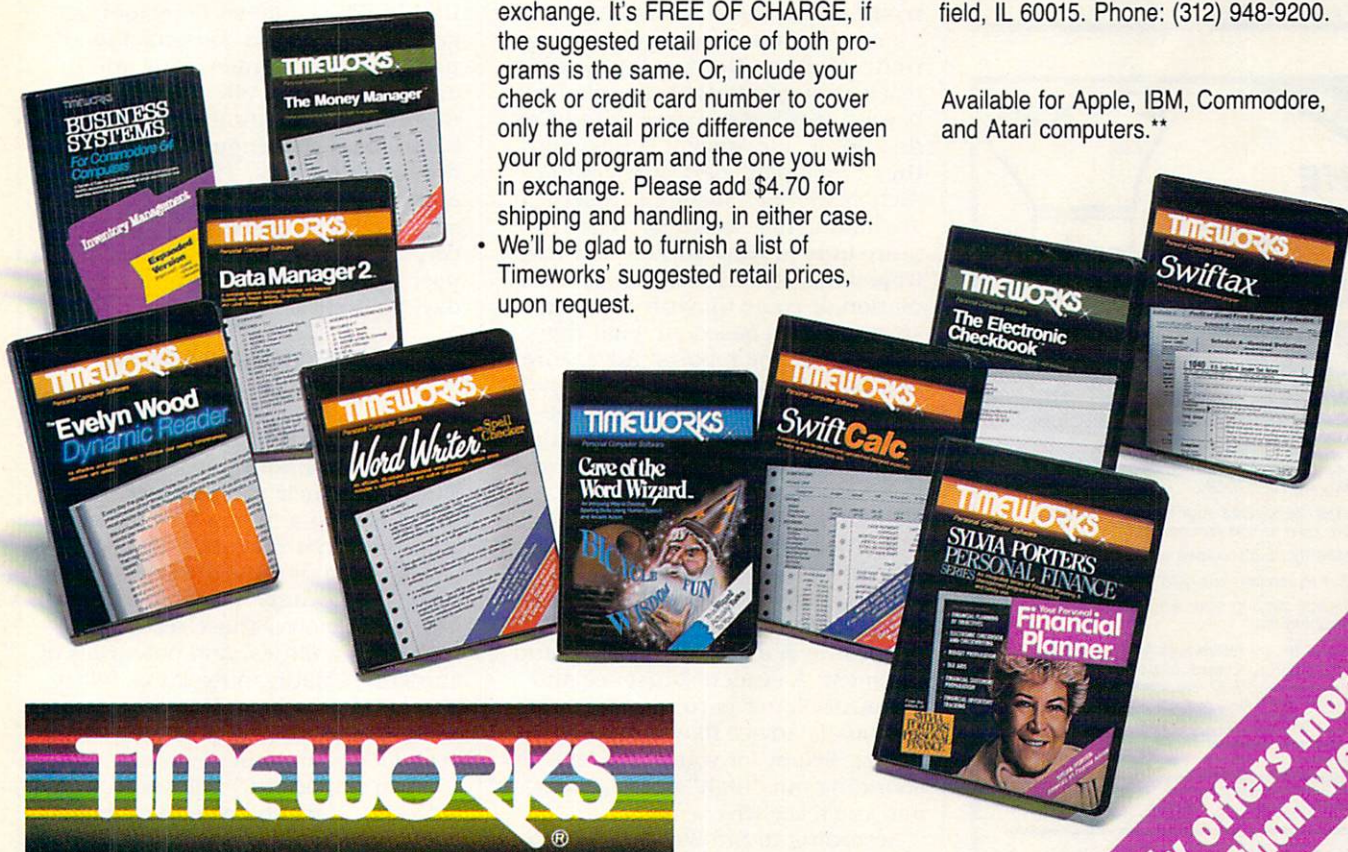
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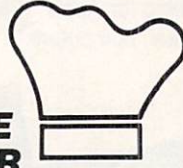
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READING FOR MEANING

Even if your children can sound out words and put them together in sentences, there's no guarantee they'll understand what they've read. Reading comprehension, learning to read for meaning, is the fourth crucial category of reading skills.

To comprehend written material, kids have to be able to classify words (Is it an action, an object, a place?), pick up story details, distinguish between real or make-believe, put sentences in order, and decide who's talking or narrating.

You can follow two routes in choosing software to help improve your child's comprehension. There is a straightforward approach. *Reading Keys*, for instance, stresses reading for meaning, among other skills.

Another no-nonsense package, *Mr. Readwell* (Micrograms, for C 64), consists of numerous short reading selections and corresponding questions about the content. After the child answers, the computer shows how many mistakes have been made, if any, but doesn't reveal the correct responses. Children try again. They move on only after correctly answering all questions.

For a second, more entertaining route, Barbara Devir, a fourth-grade teacher, suggests that parents look beyond reading software. *Mind Castle I* (MCE, for Apple II series) and the "Twistaplot" part of *Microzine* (Scholastic Inc., for Apple II series) are among her favorites. "They require kids to read puzzles and maps from which they must decode information or come up with different story endings based on what they have read," she reports. Adventure games, both with and without pictures, call on reading and puzzle-solving skills. A heavy dose of fun helps these programs go a long way.

SPELL IT RIGHT

Although not a reading skill, spelling certainly is a related skill. And there's a big bouquet of software devoted to improving it.

Spelling is a visual skill, first and foremost. A student must see and memorize letter patterns in words. Simplistic advice like "sound it out" is insufficient for young spellers. Try sounding out "high" and "friend," and you'll see why.

According to Sid Weathermon, a district reading specialist, the computer is especially effective in this area. "The computer provides repetition, which helps students retain the image of correct spellings."

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Devir recommends *Magic Spells* (The Learning Company, for Apple II series, Atari, C 64, IBM PC/PCjr, TRS-80 CoCo). It consists of three programs: "Scramble Spells" asks students to unscramble words; "Flash Spells" asks students to spell a word that has just been flashed on the screen; and "Spell Writer" enables parents to enter individually tailored word lists. *Magic Spells* is engaging, and yet, "the game aspects take a respectful second place to the academic content."


Spell-A-Vision (Cross Educational Software, for Apple II series, C 64, IBM PC/PCjr) aims at developing visual memory skills. Designed for poor spellers in grades four and up, it contains 8,000 words organized in lists ranging from one syllable to more challenging four- and five-syllable words. This is a drill-and-practice program in the strictest sense, with no games or graphics to confuse poor spellers. With regular use, even for a mere 15 minutes a day, poor spellers do improve.

PARENTS AND READING

"Parents are the ones who set the stage for reading," explains Madigan. Expose kids to as much written material as possible. Read to them. Encourage their vocabularies. Help them develop a method for understanding what they read, she says.

Turn to your child's teacher for help. "Elementary-school teachers are trained to diagnose reading problems, abilities, and potentials of students," Madigan explains. "They also know which reading theories and practical approaches may work best with your young learner."

"Most important," she adds, "work with your kids and give them opportunities for lots of practice reading."

Providing practice is what the computer does best. It's an excellent tool that may help your child get a grasp on reading—and access to the worlds that unfold with it. 

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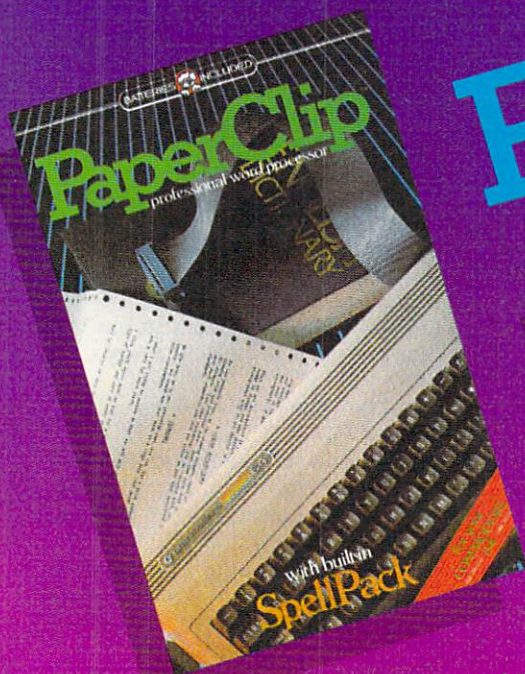
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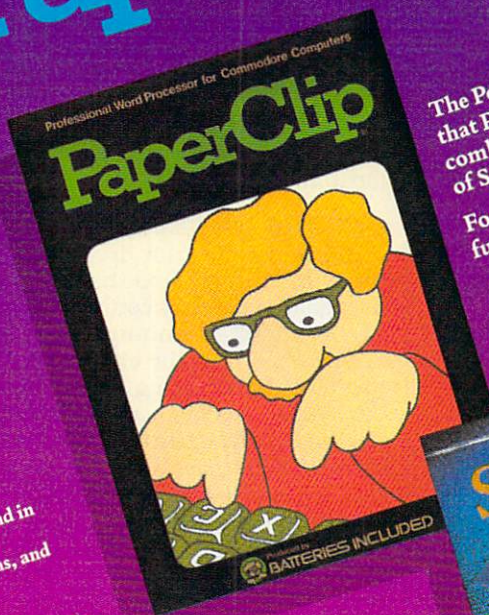
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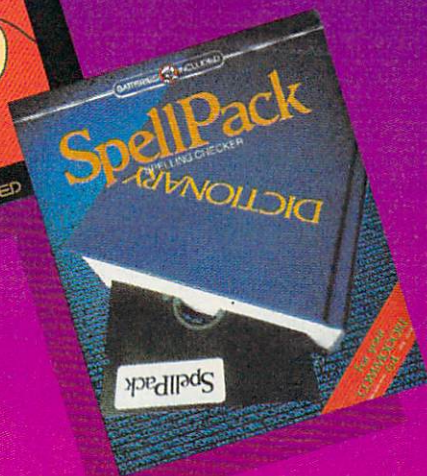
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TELECOMPUTING

DOES FATHER KNOW BEST?

Dad Had the Good Sense to Buy a Modem.
His Son Had the Smarts to Show Him How to Use It.

BY RICK AND RICHARD FORAND

RICK'S VERSION

My son fell in love with my IBM PC the day it arrived, but his love turned to lust when I added the modem. Actually, I added the modem mainly for him, since for me, the computer is only a word-processing tool that I use in my profession as a freelance writer.

I consider the money that I shelled out for the modem an investment in my boy's future. I knew that he would get a kick out of being able to talk to other computers and electronic bulletin boards, but I never dreamed that it would spark his imagination the way it did.

Two days after we got the modem, he came running into the house after school clutching a scrap of paper. It was the telephone number of one of the many free bulletin boards in our city.

He practically pushed me out of the way to get to the keyboard and crank up the telecommunications software. He got a busy signal at least a dozen times before finally getting through.

I could feel his excitement as he signed on to his first electronic conversation. A menu appeared, and among the choices was one that read TALK TO THE SYSOP.

It looked like a foreign language to me, but Richard knew immediately that it meant that he could talk to the bulletin-board operator. He wasn't the least bit reluctant about punching in the code that would bring a total stranger on-line.

He signaled for the operator and sat back with his arms crossed, waiting confidently for a reply. (I have to admit that I didn't really expect anything to happen.)

A few seconds later, words began to appear on the screen. "HI RICHARD. I'M BRIAN. ARE YOU A NEW USER?" Without hesitation, my son's fingers began flying around the keyboard. The

RICK and RICHARD FORAND live in a suburb of Atlanta. Rick, an engineer with AT&T, is also a freelance writer specializing in fiction. His son, Richard, is a sophomore in high school. He's interested in computers, science, and astronomy.



boy had made an instant friend; they clicked back and forth for almost an hour.

GETTING HOOKED

Before the operator dropped off of the line, he suggested that my son download a file that contained the names and phone numbers of every bulletin board in the city. He even provided downloading instructions.

Five minutes later, my printer was clacking away, churning out the list of bulletin boards. While he was on-line, my son also downloaded a telecommunications program from the list of freeware. PC-Talk, I think it's called. It's a much better program than the one that came with my modem, and even allows my computer to check for errors during downloads. (If you have an IBM PC, you can obtain your own copy by sending a blank, formatted disk to Andrew Fluegelman, The Headlands Press, P.O. Box 862, Tiburon, CA 94920—a donation is suggested).

Except for a short break for dinner, Richard didn't leave the keyboard for the rest of the night. He dialed every number on the list. There were hundreds of freeware programs available for the taking, and he downloaded quite a few.

DAD GIVES IT A TRY

My son makes the job of talking over a modem look mighty easy, but believe me, it isn't. I found that out the hard way about a week later.

Richard was mowing the grass and I decided to take a trip down

bulletin-board alley. Since we have the same first name, I figured that I'd sign on with his password and browse through the programs.

I managed to fumble my way through the sign-on procedure after being hung up on twice, due to my fat-fingering of the password. Then, I really got a shock when at last I got on and the operator came on-line. "WHERE'S RICHARD?" the green letters asked.

I don't know why, but for some reason I felt guilty, as though I was doing something sneaky. I was tempted to hang up, but I didn't know how. So, very bravely, I put my hands on the keyboard and banged out a confession. "HE'S NOT HOME. THIS IS HIS FATHER."

"I KNOW," the green letters replied smugly.

I took a deep breath and asked if it was OK if I browsed through his board. "SURE," the operator replied. "CALL ME IF YOU GET STUCK."

I spent about 10 minutes pulling up the various menus and exploring the board. I wasn't brave enough to actually try a download.

Luckily, my son came into the room just as I was ready to sign off. "What ya doing, Dad?" he asked with a smug grin on his sweaty face.

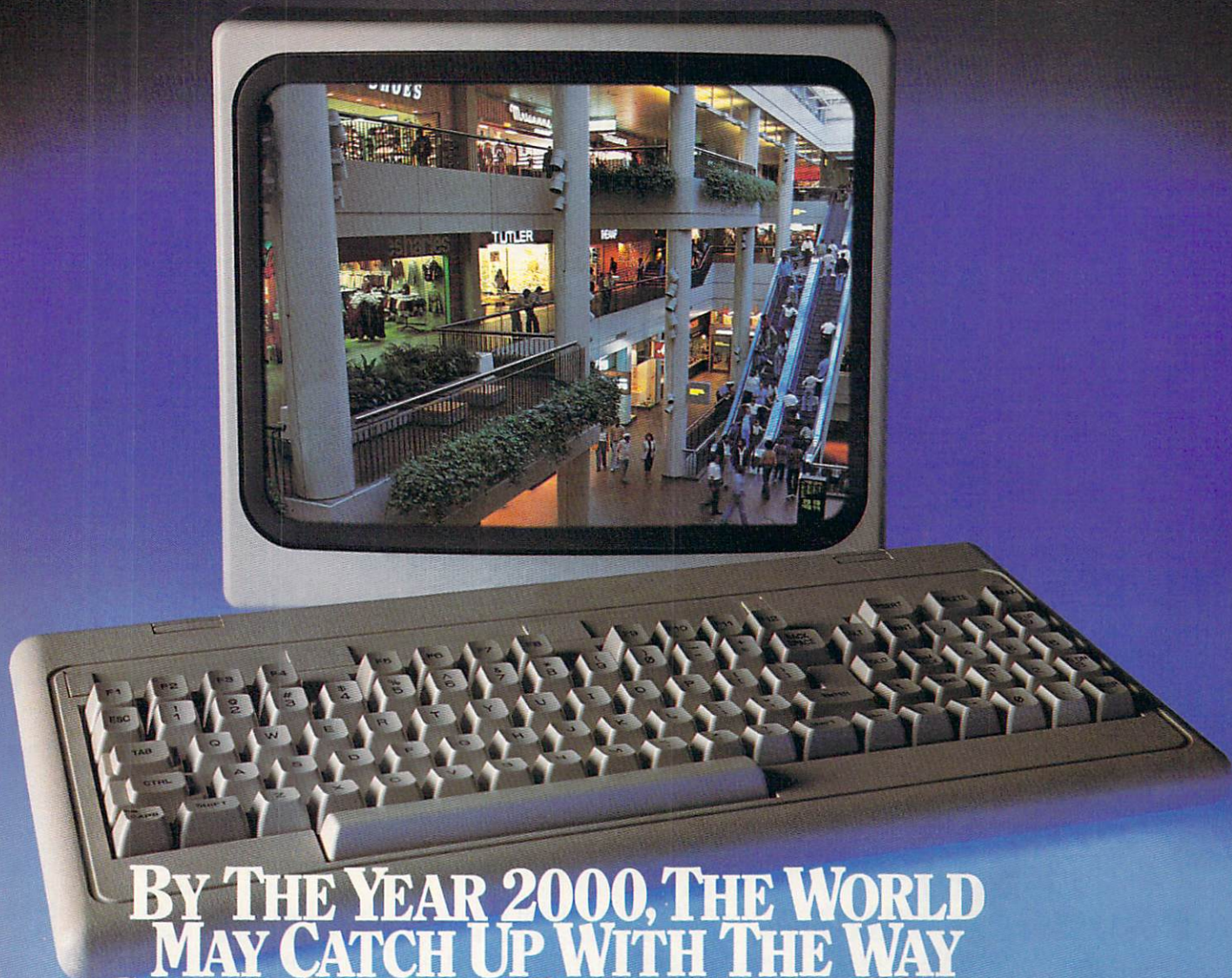
"Brian says Hi!" I muttered, hoping that I could manage the sign off without embarrassing myself.

"Type a 'G'," my son offered.

It was the code for good-bye, and it worked. Seconds later the words NO CARRIER appeared on my screen. From that point, I was able to end the program and get back to my word processing.

We've had the modem for two months now, and my son has established a network of friends like you wouldn't believe. They come in handy for much more than computer stuff. For instance, my son got a new bike and was able to sell his old one using the message section of one of the boards.

I use it just enough to keep in practice, because there is no doubt in my mind that some day I'll be brave enough to submit manu-



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"RICHARD DIDN'T LEAVE THE KEYBOARD FOR THE REST OF THE NIGHT."

scripts to my editors directly over the modem. And if I can't handle it, I can always ask Richard and his bulletin-board buddies to help.

RICHARD'S VERSION

My Dad isn't as dumb as he tries to make you believe. Don't get me wrong. Teaching him hasn't been easy, but he's coming along.

Actually, the hard part was getting him to buy a modem. He had to believe that it was his idea. I didn't act nearly as crazy as he claims that night he brought it home, but I was happy.

Most of my friends were ahead of me, so I had a lot of catching up to do. Dad makes a big deal out of it, but actually, I was the dummy in the group that I pal around with.

Dad was really impressed by the friendliness of the sysops. I guess we hit it off because most of them are not much older than me.

I'd love to run a bulletin board myself. I even have the program for one. Only problem is my Dad. So far he refuses to allow me to take up a hobby that might make the phone ring at all hours of the night.

Dad does a lot of writing for magazines so he keeps the computer tied up quite a bit. But, at least twice a week, he lets me into his computer room and rolls his chair out of the way so that I can do my thing.

Usually, I fire up the modem while he kibitzes from the sideline. (I let Dad operate it sometimes, but he's still awfully slow.) Usually, we manage to chat with a sysop or two and download something new.

DOWNLOADING

A big part of the fun happens after we sign off and look at our new downloads. Usually they have a few bugs, so first we debug the programs and then give them a try. Many of them are a waste of time, but every so often we find a real jewel. Like the other night, we found a print spooler program. It lets you print something while you are doing something else on the screen.

Dad likes the dull programs best. His favorites are PC-file (a data-base

program he uses to track his manuscript submissions) and Newkey (a function key programmer that's real handy when you have to type in the same thing over and over).

Personally, I go for the games and graphics programs, and I have some really neat ones, like *Hopper*, *Bounce The Baby*, and *Chess*. *Hopper* is a color-graphics program similar to *Frogger*, but a lot more fun. You have to make a frog jump over speeding cars, waterfalls, and logs. Even Dad gets excited—when I can get him to play it. *Chess* is much harder than the store-bought program that we have for my TI-99/4A. The guys that write those public-domain programs are great programmers. I'd like to be that good some day.

I use about a dozen bulletin boards around Atlanta. They offer much more than just free programs. A lot of what I've learned came from the message section of these boards. It is the place where hackers go when they are stumped.

Like last week, we downloaded our first library program. No matter what I tried, I couldn't make it run. It just sat there and looked at me. So, I left a question on the board and the next night I had my answer.

It still took Dad a few nights to learn how to extract files, but after a dozen or so trials, he managed. Boy, was he proud. I managed not to laugh at his enthusiasm. Adults need all the encouragement they can get.

Dad calls me "Computer Genius," and it embarrasses me. Using a computer is easy. I think some adults have a hard time because their minds are cluttered with so many other things.

Dad says that the editor wants this article sent to him by modem. He's a little nervous about it so I guess I'll have to help him. ☐

ANIMATION CONTEST!

FAMILY COMPUTING's *Electronic Edition* on CompuServe (GO FAM), in conjunction with CompuServe and Interactive Picture Systems (IPS), is offering prizes for the best animation created with the IPS program MovieMaker! Go online for contest rules or look in our June issue. Also, the Forum is filling up with programs from the magazine, as well as lively MovieMaker files.

On the first Sunday of each month, the editors host an electronic conference, often featuring a special guest. Kickoff time is 8 p.m. EST.

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COMPUTING CLINIC

EXPANDING THE APPLE II PLUS • PRINT BUFFERS •
MIXING MACHINE LANGUAGE WITH BASIC •
COMMODORE 64 FILES • TI SPEECH

BY JEFFREY BAIRSTOW

I own an Apple II plus, and I have expanded it from 48K to 64K. I was wondering if I could expand the memory to 128K, or is 64K the limit?

THOMAS SCANNELLO

Hicksville, New York

Yes, you can expand the Apple II plus to 128K or more with a RAM card from companies such as Titan (RAM Board, \$199 for 64K, \$269 for 128K; [313] 662-8452) or others listed in mail-order ads. However, new commercial programs designed for the 128K Apple IIc or IIe are not likely to work. (Exceptions are Software Arts VisiCalc and VisiCorp's FlashCalc.) According to an Apple technician, this is because on the II plus, the RAM expansion card must go in one of the standard slots, where it will be accessed as a RAM disk. (Both Titan RAM cards include RAM disk software.) It will not, then, add any more "usable" memory. On an Apple IIe, on the other hand, the RAM expansion goes into an auxiliary slot, so programs can access this added memory directly.

What is a print buffer, and how do I use it with my computer?

PETER SULLIVAN

South Pasadena, California

Print buffers permit files or data to be transferred (or "dumped") from the computer at a very high speed into a holding bin, and then fed from this bin (or buffer) to the printer at a much slower rate. This way, the printer can handle the input easily, without being overloaded. And the computer is free to be used for other tasks.

Print buffers (also called "spoolers") often are boxes that stand between the computer and the printer. An example of the stand-alone type is the Microfazer made by Quadram Corp. (Orange Micro and Practical Peripherals are two other companies that sell buffers.) Also, many printers are sold with built-in buffers, from 2K on up. A 2K buffer will store about a page of text.

I use a word processor, Multimate,

JEFFREY BAIRSTOW is a contributing editor for FAMILY COMPUTING.

with yet another type of print buffer. The program contains a RAM-based print spooler. When I send a long file to the printer, it is stored in a special area of RAM and fed to the printer while I work on another document. For serious word processing, some form of buffer is essential so that work is not interrupted while printing takes place.

I have a TI-99/4A with a speech synthesizer, but my 2-year-old daughter hates the male-sounding voice. Can I program the synthesizer for a female voice?

TIM ROTZELL

St. Louis, Missouri

You can program a female-sounding voice if you have or can get the Terminal Emulator II cartridge and its documentation. On page 34 of the documentation, there's an explanation of how to adjust the pitch, or highness, of the voice in a BASIC program (which is listed on page 37). The pitch can be assigned a value between 0 and 63—with 0 being a whisper, 1 the highest pitch, and 255 the lowest. If you need to know more about speech-synthesizer programming, you can call TI at (800) TI-CARES.

FAMILY COMPUTING's Primer (October 1984) suggested that machine language is the only language a computer understands. Does this mean I can program in machine language together with BASIC on my Radio Shack Color Computer?

ANDY SZUL JR.

Philadelphia, Pennsylvania

Machine language is indeed the only language a computer understands—without the benefit of an assembler, an interpreter, or a compiler, which translates programs written in other languages into machine language. (See Dr. Cursor's Klinik in this issue for more on machine language.) If you'd like to know more about assembly language, your local Radio Shack Computer Center has several useful, well-written books on the subject. *Getting Started with Color BASIC*, (page 267), which comes

with every Color Computer, explains how to use machine language in BASIC programs.

To answer your question: Yes, you can mix machine language into a BASIC program on any microcomputer. Once you've written the machine-language program, three steps are involved:

1. Find an area of memory not used by BASIC, the operating system, or your program, where you can put the machine language. On the Color Computer, you can tell BASIC to reserve memory space with the CLEAR statement.
2. Place your machine-language program into the area of memory you've selected. There are several ways to do this, including POKEing it in using DATA statements, or reading a binary file from disk or tape with the CoCo's LOADM or CLOADM statement.
3. Tell your BASIC program where you've put your machine language, and use the USR call in BASIC to execute the routine. (On some micros, the CALL statement performs both functions.)

READER INPUT

With regard to your comments on erasing Commodore 64 disk files (Computing Clinic, February 1985), I also had problems erasing files and stumbled on this solution:

```
OPEN 15,8,15
PRINT#15,"$0:FILENAME.PRG",8
CLOSE 15
```

My machine did not recognize the SCRATCH instruction without the filetype (PRG). Maybe this will help your readers.

SHIRLEY EHRLICH

Herington, Kansas

Thanks for your suggestion. According to Commodore, and my own tests, the only time you actually need to use the filetype extension (PRG here) is when you are using the Epyx Fast Load Cartridge (see New Hardware Announcements). However, you have nothing to lose by using it at any time. Incidentally, the full command is "SCRATCH\$0:FILENAME.FILETYPE".8, but the command can be shortened to "\$0" as in Shirley Ehrlich's example above.



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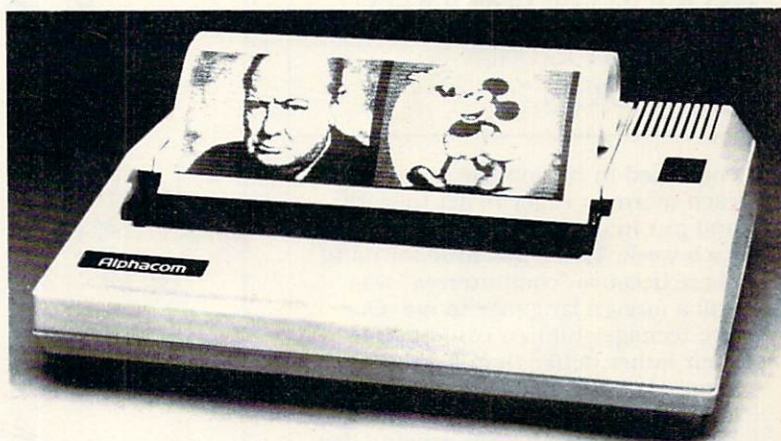
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ON-LINE

CAN MARRIAGE SURVIVE THE COMPUTER AGE? How One Couple Answered the Question

BY S. L. MEHEGAN

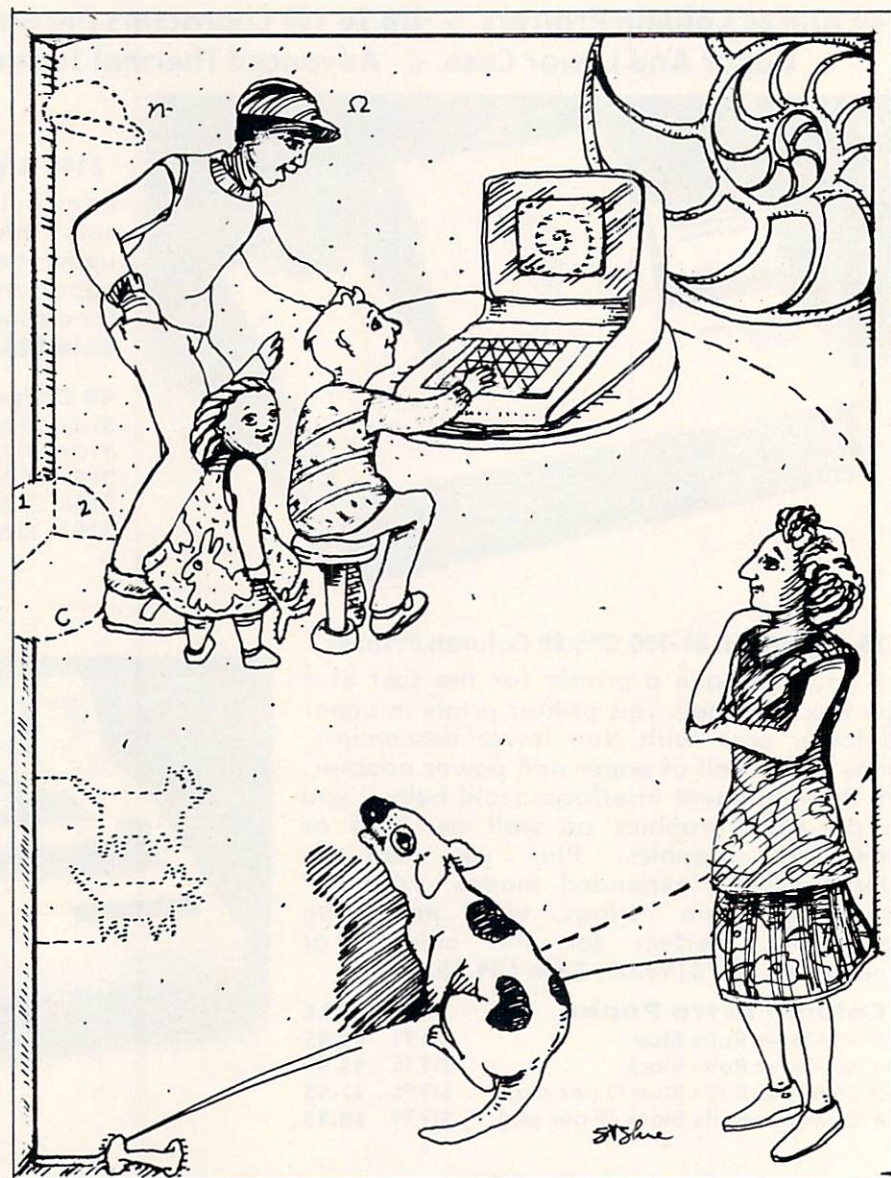
Not long ago my husband, Jim, began a new phase at work, which involved programming computerized machinery. He became totally absorbed in the computer culture. His company sent him all over the country for classes in different aspects of this fast-growing field. New excitement bubbled in Jim as he became

"IF A COMPUTER LOOMS LIKE A WALL IN A MARRIAGE, IT SHOULD BE HANDLED LIKE ANY OTHER INTRUSION."

engrossed in his job. He arose early each morning eager to get to work, and put in many hours of overtime each week. There was little for us to share because "computerese" was still a foreign language to me. Our two teenage children could talk to their father better than I could because they had had computer courses in school. I felt more excluded and sullen with each passing day. Then, to my dismay, Jim announced that he was buying a home computer. The children and Jim were excited. I was scared.

When the computer arrived, I was completely intimidated. I watched dejectedly as Jim and the kids played games and programmed their own files. They were venturing into an area where I felt unable to follow.

I had heard that a major cause for divorce today is one partner's failure



to grow while the other continues to progress into new areas or higher intellectual levels. When this happens, the number of those all-important shared experiences is reduced. And, when people no longer share common interests and stop growing together, the relationship is certain to suffer and perhaps even to disintegrate. But, in a marriage where both partners work toward maintaining the relationship, such stum-

bling blocks rarely are insurmountable.

I found that studies already have been done showing that in marriages where one partner has been drawn into the computer culture while the other remains on the sidelines, a wall grows up between them that often leads to separation and divorce. For example, one woman complained that her computer-oriented husband had programmed

S.L. MEHEGAN is a freelance writer currently living in Rochester, New York. She has two teenage children.


ILLUSTRATION BY S.J. SHUE

ON-LINE

their entire house, from the sprinkler system to the family checkbook. As a result, she suddenly knew nothing about running many formerly familiar household appliances. She said she felt like an incompetent stranger in her own home. She resented both the time her husband spent with the computer and her exclusion from a major interest in his life. Many couples have told similar stories about the invasion of computer technology into their lives.

**"THE MORE I LEARNED
AT THE COMPUTER, THE
LESS IT INTIMIDATED
ME."**

I decided, however, not to be left behind. I bought a BASIC manual, written in simple language, and an equally simple-to-understand word-processing manual. The more I learned at the computer, the less it intimidated me. Instead of being an interfering monster, the computer became a source of pleasure and discovery. My work became easier and more interesting. When Jim came home from his job, I couldn't wait to tell him about the new things I had mastered that day. Since he shared the learning process with me, our area of common interests was not only restored but increased. I finally understood his enthusiasm for this innovative technology one day when four hours at the computer terminal passed so quickly that I thought just an hour had gone by. Family communication increased, too, because all of us shared in a new common interest. Mastering the computer is a process of continuous learning, but even more important, it is an avenue for growth that we can share now.

I learned the hard way that computer involvement has to be kept in proper perspective. Computers are fast becoming a major instrument of everyday life, but involvement in them can become so all-consuming, especially when they are "new arrivals," that one's priorities may get confused. I found out that if a computer looms like a wall in a marriage, it should be handled like any other intrusion. Meet it head-on and resolve it in a way that gives the whole family a new opportunity for mutual growth and understanding. 

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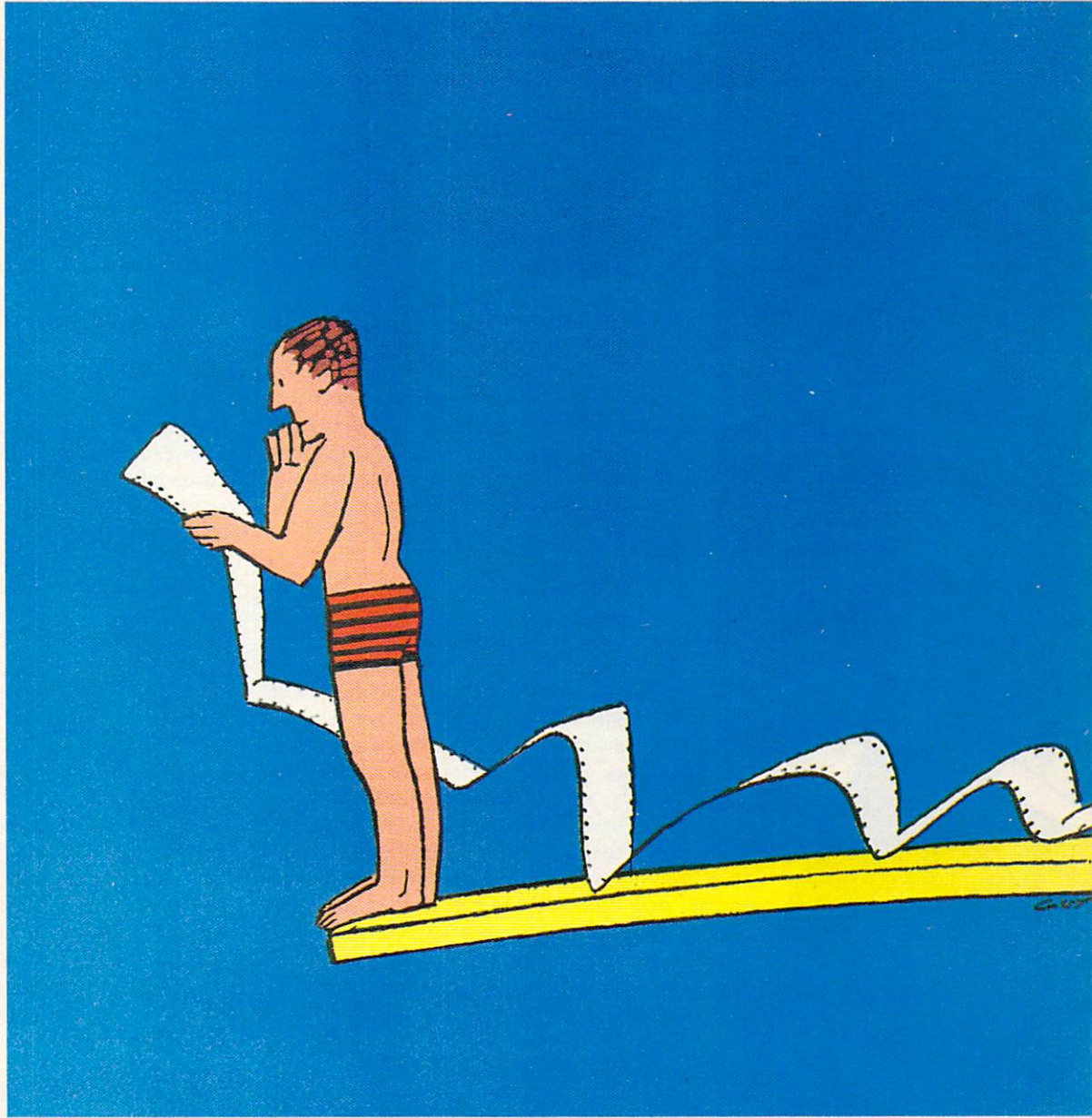
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HOW CAN YOU USE A SPREADSHEET?

BY ROBIN RASKIN

What could a backgammon tournament have in common with my family's medical records? Or a gourmet bake shop? Or thousands of tax returns? They all rely on spreadsheets. Since by now we've all discovered that life is a series of complicated decisions, it's time to let you in on another discovery: One of the best ways to view the index of possibilities is with an electronic spreadsheet.

A traditional spreadsheet is a large piece of paper ruled into rows and columns. Anyone who's ever kept a ledger will tell you rows and columns make it easy to eyeball and analyze data. Paper spreadsheets have one major drawback: Any changes to one figure in the spreadsheet means erasing and recalculating everything that follows. Electronic spreadsheets have eliminated worn-out erasers and jangled nerves. They are as simple and elegant in design as the original paper spreadsheet, but the agony of making changes is gone. Change one figure in the spreadsheet and all the affected entries are recalculated automatically.

The rows and columns can be used to enter and organize any type of data. Whether you want to keep an updated accounting of the value of your collectables, figure out whether to rent or buy, try to decide which summer camp offers the most options, or predict next quarter's gross income, a spreadsheet takes the tedium out of endless numerical finagling.

THE 'WHAT IF' MACHINE

Myra Portwood wonders how much an increase in the cost of chocolate will affect the price of her eclairs at The Bakery in Sebastopol, California. With a spreadsheet, it's a lot easier to find out. She and her husband, Gene, use their Apple and *Multiplan* to give them a simple recipe for success. The Portwoods track the daily sales of their luscious European-style baked goods and chocolates, and they also track the prices of raw goods to determine the final cost of their products. "First we list all the raw ingredients, how much we need for the recipe, and the quantity we want to bake. We can play with the spreadsheet and see how much it will cost to bake x number of loaves," says Gene. "Over time, if we see we're spending more and more on an ingredient, we'll adjust the price of our goods."

"Next, we enter the number of items sold every day. As the days get totaled into months, the months into quarters, and the quarters into years, we can calculate how well we're doing and project future sales and trends. Did you know that a bakery does very well on Mother's Day but zilch on Father's Day?" asks Gene.

"The spreadsheet is fairly simple stuff, but combined with our *Time Is Money* package (an electronic ledger), we have everything we need to manage a small, but thriving business. We even got our original bank loan by showing the bank our projected cash flow analysis on a

spreadsheet. I think it helped to show we had done some realistic planning."

DOLLARS AND SENSE AT HOME

"I'm not as interested in the *what ifs* as I am in the *what is*," says Gary Straub, a sound technician and professional deejay from Mays Landing, New Jersey. "I'm 46 years old and I've been disorganized about paperwork, especially paying the bills, for most of my life. My *AppleWorks* integrated software and my IIc have done more to organize my life than anything else."

Gary uses the *AppleWorks* spreadsheet to keep track of all his household budgeting, including income-tax preparation and checkbook balancing.

"When I began," he says, "I transferred the data from a handwritten ledger I'd been keeping. Now, every single day I get into my spreadsheet program and update it with the day's transactions. You've got to do it daily," says Gary emphatically. "If not, you get rusty. The software's got to be second nature to you."

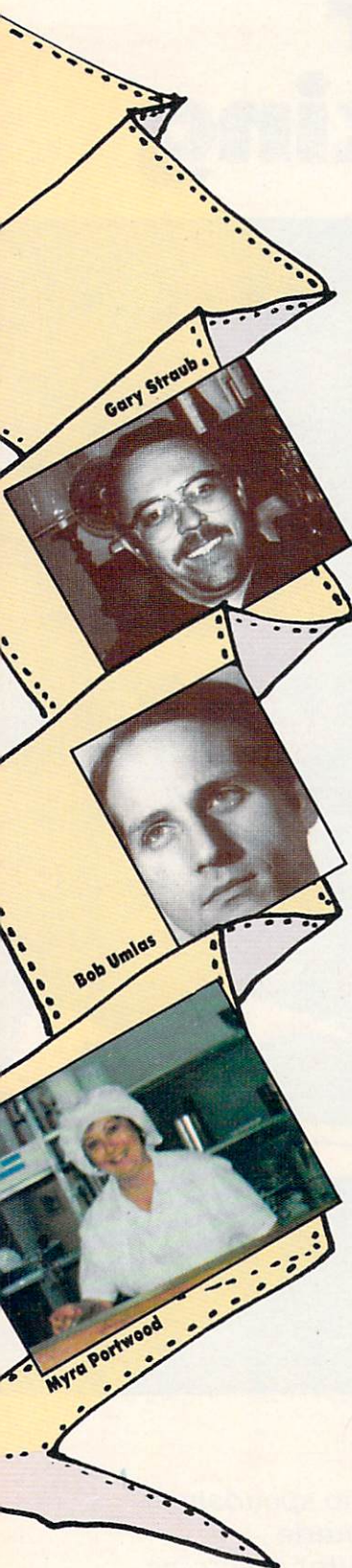
THE FUN OF IT

Spreadsheets make games out of numbers. Anyone who loves watching, predicting, and reassessing as numbers do their thing will love spreadsheets. That makes spreadsheets fun for accountants and investment analysts—and for a lot of other people. Bert Ledina, of Monticello, New York, uses a Commodore 64 extensively in his law practice. But on weekends and after school you'll find him, C 64 nearby, using *Multiplan* to track the results of his daughter's gymnastics team. Each girl is assigned a number and scores are entered for the various competitions. Totals for each contestant, each team, and each event are a snap.

Bob Umlas, a senior technical consultant with CBS software, is another big fan of *Multiplan*, but he uses the Macintosh version. An avid backgammon player, Bob keeps tabs on his tournament wins and losses on disk. He's also a bit of a fanatic for calendars, which led him to create a perpetual calendar. Just ask him what day of the week your birthday falls on in 2010! He tracks the sign-ups and attendance for a personal improvement seminar group he belongs to using a spreadsheet, too.

START SPREADING THE DATA!

Do you want to create a scenario about affordable loan payments? (See accompanying article, "How to Use a Spreadsheet to Help Buy a Home.") Maybe you want to calculate the savings in alternative long-distance carriers for your home telephone service. Or how much money you need to put aside from each paycheck to save for the kids' college tuition. Start spreading the data! If it's numbers you're interested in, spreadsheets let you do the "thinking" while the computer does the work.



ROBIN RASKIN is a contributing editor for FAMILY COMPUTING.

REVIEWS OF SOME NOTABLE PROGRAMS

BY SHARON AKER, JOE GELMAN, ROBIN RASKIN, AND DAVID WILSON

Reviews and chart entries for this report on spreadsheets were written by our regular contributors. Each writer looked at programs for the computers they know best: Aker on the Commodore and the Macintosh; Gelman on the TI-99/4A, and Radio Shack Model III and Color Computer; Raskin on the IBM and Atari; and Wilson on the Apple and ADAM.

Programs written for more than one machine were reviewed separately in each format. This accounts for some of the differences in opinion—and capabilities—that you'll note in this report. Remember that a program's features are dependent on the computer that runs it. In this report, we've tried to focus on those programs that take best advantage of the machine(s) they are designed for. As always, the best advice we can give you is: Look carefully at a piece of software before you buy—especially when it's expensive.

ADAM

Overall, **ADAMCalc** is slow and will frustrate experienced spreadsheet users. Unfortunately, ADAM owners don't have much choice.

ADAMCalc sports a greater number of cells than most spreadsheets but requires a memory upgrade to use them. The program is further enhanced with an on-screen calculator, the option to change the color of both the background and type, model templates, and well-indexed, clearly written documentation. Unlike other programs which give you a letter and number cell reference, e.g. B43, ADAMCalc annoyingly requires cells to be designated by numbers for both column and row, which results in a tedious method of cell designation, e.g. [5,1] or [44,63].

APPLE II SERIES AND MACINTOSH

Just a few short years ago, spreadsheets—so widespread and widely used now—were beyond the comprehension of most computer users. The introduction of **VisiCalc** changed the makeup of the computer-owner population dramatically. The software made owning an Apple computer desirable for a multitude of businesspeople who were not at all interested in computers per se. The spreadsheet provided, in effect, the first legitimate answer to the question, "What's a computer good for?"

Although spreadsheets have evolved considerably since **VisiCalc** was introduced, working with it is

still comparatively comfortable. That speaks volumes for the originality and design sense of its creators. **VisiCalc** has all the essentials, interconnected in a convenient matrix, and presented without nonsense or pretense. **Advanced VisiCalc**, available in the same package, adds many conveniences without complicating or taking away from the original. However, the on-line tutorial is sluggish, and I do wish there was some printed documentation for the program.

PractiCalc II is just plain sensational. I especially liked the rapidity of recalculation (even with a fair amount of entered data); the enhanced labeling mode, which allows easy insertion of paragraphs of text into the spreadsheet; the facility for searching through spreadsheets using wild cards; its easy-to-use option menu; and its sparse, unimposing, but totally sufficient documentation. My only misgiving about this program is the decision to label rows with letters, and columns with num-

bers—contrary to custom. There are so many things done well, however, I will not quibble. This is a best buy.

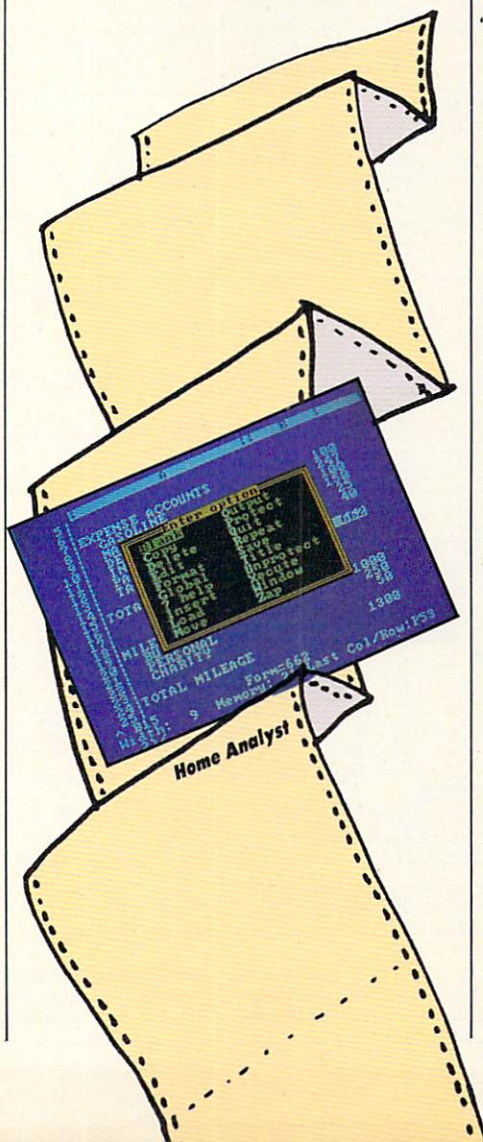
Editor's note: In addition to PractiCorp's marketing of this program, now Spinnaker markets PractiCalc II as Spreadsheet, part of its Better Working series. The spreadsheet will integrate with the word-processing and data-base programs included in the series.)

FlashCalc, VisiCorp's (now Paladin's) replacement for its **VisiCalc** program, is another strong entrant into the home spreadsheet market. The program lives up to its name. It calculates more rapidly than any of the other spreadsheets we examined here. **FlashCalc** is accompanied by complete and lucid documentation and requires only one disk. I liked its expansive, full-prompt menu, but was a little annoyed by its slow scroll. This program provides substantial benefits over regular **VisiCalc**, but falls considerably short when compared to **Advanced VisiCalc**.

I must agree with critics of **AppleWorks**. It's too expensive (\$250) for home users and too limited for real business uses. Still, I find that in practice, I keep using it in preference to other more powerful programs. One reason is that once you learn how to use the program (and it is easy to learn!) you'll find that for most limited spreadsheet, word-processing, and data-base chores, it is fun and convenient. The facility it provides for transfer of data from data-base to spreadsheet and spreadsheet to word processor becomes more useful as I daily conceive of new applications. I would not like to give up **AppleWorks** now that I have grown dependent on it.

There is only one spreadsheet program available for the Mac for now, so users are lucky that it is an excellent one. Microsoft's **Multiplan** has every feature you could want in a spreadsheet, and then some. In addition, information from **Multiplan** can easily be transferred into Microsoft's Mac programs for word processing and charting.

Multiplan makes excellent use of the Mac menus and mouse. The mouse, in particular, makes spreadsheeting easier than on other computers. Clicking right on a cell is faster than scrolling to it or typing in a reference like R2C4. And, the first time you define a group of cells in a formula by simply dragging across them with the mouse cursor, you'll wonder how people manage on other computers.



SUMMING UP SPREADSHEETS: THE SOFTWARE AT A GLANCE

KEY TO CHART AND EVALUATIONS

To get the most out of this article and its accompanying chart, we've detailed the terms and the criteria used to evaluate the software reviewed.

STATISTICS

MATH FUNCTIONS FOR FORMULAS: In general, the more math functions, the more powerful the program. However, you may not actually need all those functions. Don't evaluate programs on this number alone.

SORTING: 1) Numeric sort—can columns be sorted numerically? 2) Alpha sort—can columns be sorted alphabetically? 3) Reverse sort—can columns be sorted from highest value to lowest?

LINK CAPABILITY: Can you incorporate information from one spreadsheet file into another?

COMMUNICATION: Can info from sheet come from, or be "pasted" into, another program—word processor, data base, graphics?

EASE OF USE

ERROR HANDLING: Consider how well the program accommodates problems. Any crashes or freezes when using the sheet? Can you back out of a wrong menu choice? Are you prevented from accidentally wiping out an entire file if you try to save another under the same name? Are you prevented from quitting the program if the current sheet hasn't been saved?

FILE HANDLING: Overall rating based on ease of operation as well as the following specifics: 1) Can you initialize (or format) a new data disk from within the spreadsheet program? 2) Can you check which sheets are stored on your data disk? 3) Is it easy to rename and delete files?

NAMED CELLS: Can you name cells or groups of cells so the names can be used in formulas instead of cell designations? (For example, A20-A19 can be expressed as GROSS-EXPENSES.)

DATA ENTRY

MOVING AROUND: Can you 1) Move from one row/column to the next as data is entered? 2) Move up a row, back a column? 3) Move to top or bottom of screen? 4) Move to beginning or end of current row/column? 5) Move to beginning or end of sheet? 6) Use GOTO commands?

AREA REPLICATION: Can you replicate portions of rows, columns, or other sections of the sheet?

SHEET DESIGN

INDIVIDUAL COLUMN WIDTH: Can individual columns be of different widths?

MOVE ROW/COLUMN: This is almost the same as Replicate (under Data Entry), except that the original data is removed here.

NUMERIC FORMATS: Can you define number cells to contain: 1) Dollar amounts that automatically will have dollar signs and two decimal places? 2) Numbers with fixed decimal places? 3) Integers? 4) Percents (is the percent sign automatically added)?

			Statistics						Ease of Use
PROGRAM	MANUFACTURER	PRICE	MEMORY REQUIRED	MAX # ROWS/COLS	# OF MATH FUNCTIONS	SORTING: NUMERIC/ ALPHA/ REVERSE	LINK CAPABILITY	COMMUNICATION	ERROR HANDLING
ADAM									
ADAM CALC	Coleco 999 Quaker Lane S. West Hartford, CT 06110	\$49	80K	255/255	31	ALL	YES	SOME	GOOD
Apple									
APPLEWORKS	Apple Computer 20525 Mariani Ave. Cupertino, CA 95014	\$250	64K	999/127	16	ALL	YES	EXTENSIVE	EXC
FLASHCALC	Paladin Software 2895 Zanker Road San Jose, CA 95136	\$99	64K	254/63	41	NONE	YES	SOME	AVG
MULTIPLAN (Macintosh)	Microsoft 10700 Northrup Way Bellevue, WA 98009	\$195	128K	255/63	30	ALL	YES	EXTENSIVE	EXC
PRACTICALCALC	Practicorp 44 Oak St., The Silk Mill Newton Upper Falls, MA 02164	\$49	48K	250/100	36	ALL	NO	SOME	GOOD
VISICALC	Software Arts 27 Mica Lane Wellesley, MA 02181	\$179, comes with advanced version	64K/128K (Adv)	254/63	36	NONE	NO	SOME	GOOD
Atari									
SYNICALC	Synapse 5221 Central Ave. Richmond, CA 94804	\$49	48K	255/128	32	ALL	YES	SOME	GOOD
Commodore									
CALC RESULT	Handic Software 520 Fellowship Road Mt. Laurel, NJ 08054	\$49	64K	254/63	22	NONE	YES	SOME	AVG
CAL-KIT	Batteries Included 30 Mural St. Richmond Hill, Ontario L4B 1B5 Canada	\$49.95	64K	99/26	5	NONE	NO	SOME	GOOD
CREATIVE CALC	Creative Software 960 Hamlin Court Sunnyvale, CA 94089	\$49	64K	255/64	12	NONE	NO	SOME	AVG
MULTIPLAN	HesWare 150 N. Hill Drive Brisbane, CA 94005	\$99	64K	255/63	40	ALL	NO	SOME	EXC
SPREADSHEET	Spinnaker 1 Kendall Square Cambridge, MA 02139	\$49	64K	250/100	30	ALL	NO	NO	GOOD
SWIFT-CALC	Cosmi 415 N. Figueroa St. Wilmington, CA 90744	\$24	64K	254/26	13	NO REVERSE	NO	NO	GOOD
IBM PC and PCjr									
CREATIVE CALC	Creative Software 230 E. Caribbean Drive Sunnyvale, CA 94089	\$59	128K	255/64	13	NONE	YES	SOME	GOOD
FLASHCALC	Paladin Software 2895 Zanker Road San Jose, CA 95136	\$129	64K	254/63	42	ALL	NO	SOME	POOR
HOME ANALYST	Peachtree 3445 Peachtree Road, N.E. Atlanta, GA 30326	\$99	128K	254/63	22	NUMERIC ONLY	NO	SOME	GOOD
LOTUS 1-2-3	Lotus Development Co. 245 First St. Cambridge, MA 02142	\$495	192K, PC/128K, PCjr	2048/256	55	ALL	YES	EXTENSIVE	EXC
MULTIPLAN	Microsoft 10700 Northrup Way Bellevue, WA 98009	\$195	128K	255/63	46	ALL	YES	EXTENSIVE	GOOD
MY CALC	Computer Easy 414 E. Southern Tempe, AZ 85282	\$19	128K	255/62	43	ALL	NO	SOME	GOOD
PERFECT CALC	Thorn EMI 3197 C Airway Ave. Costa Mesa, CA 92626	\$199/ \$139 (PCjr)	128K	255/52	47	ALL	YES	EXTENSIVE	GOOD
PFS: PLAN	Software Publishing 1901 Landings Drive Mountain View, CA 94033	\$140	128K	48/20 (128K) 176/64 (256K) 255/70 (320K)	15	NONE	YES	EXTENSIVE	GOOD
SUPERCALC 3	Sorcim Corp. 2310 Lundy Ave. San Jose, CA 95133	\$395	96K	254/63 (96K) 9999/127 (192K)	60	ALL	YES	EXTENSIVE	EXC
VISICALC	Software Arts 27 Mica Lane Wellesley, MA 02181	\$179; advanced version on same disk	192K	254/63	42	NUMERIC ONLY	NO	SOME	POOR
Radio Shack									
VISICALC (Model III)	Software Arts 27 Mica Lane Wellesley, MA 02181	\$99	48K	254/63	26	NONE	NO	SOME	GOOD
ELITE*CALC (Color Computer)	Elite Software Suite 301, 201 Penn Center Blvd. Pittsburgh, PA 15235	\$69/\$79 w/Calc. List	16K, with Extended BASIC	255/255	23	ALL	NO	SOME	GOOD
Texas Instruments									
MULTIPLAN	Triton Products P.O. Box 8123 San Francisco, CA 94128	\$99	32K (and disk drive)	255/63	44	ALL	NO	SOME	EXC
Timex									
VU-CALC	Games To Learn By P.O. Box 78 Collinsville, CT 06022	\$16	16K	26/36	5	NONE	NO	NO	AVG

LOCKED CELLS: Can you prevent cell contents from being changed (except after an unlock command)?

PRINTING OPTIONS

FORMULAS: Can you print the formula for a cell instead of its value?

OVERALL QUALITY: Can headers or footers be printed? Can pages be numbered? Are rows or columns

				Data Entry		Sheet Design				Printing Options		Documentation			Overall		
FILE HANDLING	HELP FEATURES	SEARCH FUNCTION	NAMED CELLS	MOVING AROUND	AREA REPLICATION	INDIVIDUAL COLUMN WIDTH	MOVE ROW/COL	NUMERIC FORMATS	LOCKED CELLS	FORMULAS	OVERALL QUALITY	OVERVIEW	TUTORIAL	INDEX	PERFORMANCE	VALUE FOR MONEY	COMMENTS
EXC	GOOD	YES	NO	AVG	YES	YES	YES	GOOD	YES	YES	GOOD	GOOD	AVG	GOOD	AVG	GOOD	Integrates with SmartWriter.
EXC	EXC	YES	NO	GOOD	YES	YES	YES	EXC	YES	YES	EXC	EXC	EXC	GOOD	EXC	GOOD	Easy to learn; convenient to use; a 3-in-1 package.
GOOD	GOOD	NO	NO	AVG	YES	YES	YES	AVG	YES	YES	GOOD	AVG	AVG	EXC	GOOD	AVG	An improvement over VisiCalc.
GOOD	EXC	YES	YES	EXC	YES	YES	YES	EXC	YES	YES	EXC	GOOD	GOOD	GOOD	EXC	EXC	Feature-laden; makes good use of mouse.
GOOD	GOOD	YES	NO	GOOD	YES	YES	YES	AVG	NO	NO	AVG	GOOD	AVG	GOOD	EXC	GOOD	One of the best. Also distributed as Spreadsheet (\$59) by Spinnaker.
GOOD	NO	NO	NO	AVG	NO	NO	YES	GOOD	NO	NO	AVG	GOOD	GOOD	GOOD	AVG	AVG	All the essentials; advanced version adds features.
EXC	NO	YES	YES	GOOD	YES	YES	YES	EXC	YES	YES	GOOD	EXC	GOOD	YES	EXC	EXC	Makes good use of Atari's features, including color.
GOOD	GOOD	NO	NO	GOOD	YES	NO	YES	AVG	NO	YES	GOOD	GOOD	AVG	POOR	GOOD	GOOD	Has color option.
EXC	GOOD	NO	NO	EXC	NO	YES	NO	AVG	NO	YES	GOOD	GOOD	GOOD	NO	AVG	AVG	Designed for simple applications; bonus: 20 templates.
GOOD	NO	NO	NO	GOOD	YES	YES	NO	AVG	NO	NO	AVG	GOOD	EXC	AVG	GOOD	GOOD	Has color option; interfaces with Creative Writer.
AVG	GOOD	NO	YES	EXC	YES	YES	YES	EXC	YES	YES	EXC	GOOD	EXC	GOOD	EXC	EXC	Files can be saved in format readable by some word processors.
POOR	NO	YES	NO	AVG	YES	YES	YES	GOOD	NO	YES	GOOD	AVG	EXC	GOOD	GOOD	GOOD	Interfaces with data base and word processor.
AVG	NO	NO	NO	GOOD	YES	YES	NO	EXC	NO	NO	AVG	POOR	POOR	NO	GOOD	EXC	Pop-up menus make command selection convenient.
AVG	NO	NO	NO	EXC	NO	YES	YES	AVG	NO	NO	GOOD	GOOD	GOOD	YES	GOOD	GOOD	A no-frills, comprehensive package.
EXC	GOOD	YES	NO	GOOD	YES	YES	YES	GOOD	YES	YES	GOOD	GOOD	GOOD	YES	GOOD	GOOD	Spruced-up VisiCalc.
EXC	GOOD	YES	YES	EXC	YES	YES	YES	GOOD	YES	YES	GOOD	AVG	GOOD	YES	GOOD	GOOD	Includes helpful templates; good for beginners. Uses color well.
GOOD	EXC	YES	YES	EXC	YES	YES	YES	EXC	YES	YES	EXC	EXC	EXC	EXC	EXC	EXC	Doubles as a powerful data base.
EXC	GOOD	YES	YES	EXC	YES	YES	YES	GOOD	YES	YES	GOOD	GOOD	GOOD	YES	GOOD	GOOD	Complex but comprehensive.
POOR	GOOD	YES	NO	AVG	NO	YES	YES	GOOD	NO	YES	GOOD	AVG	POOR	NO	EXC	EXC	Best buy!
GOOD	EXC	YES	YES	EXC	YES	YES	YES	GOOD	YES	YES	GOOD	EXC	EXC	YES	EXC	GOOD	Interfaces with data base and word processor.
AVG	EXC	NO	YES	GOOD	NO	YES	YES	GOOD	NO	YES	EXC	GOOD	AVG	GOOD	GOOD	EXC	Interfaces with data base and word processor.
EXC	EXC	YES	YES	EXC	YES	YES	YES	EXC	YES	YES	EXC	EXC	EXC	YES	EXC	EXC	For the more serious user.
AVG	GOOD	YES	NO	GOOD	YES	NO	YES	GOOD	NO	YES	AVG	AVG	GOOD	GOOD	AVG	AVG	Special Jr version now on the market.
AVG	NO	NO	NO	GOOD	NO	NO	YES	GOOD	NO	YES	GOOD	GOOD	AVG	AVG	AVG	AVG	Nothing fancy, but serviceable.
AVG	AVG	NO	NO	GOOD	YES	YES	YES	GOOD	NO	Requires purchase of Calc-List	AVG	AVG	AVG	NO	AVG	AVG	Has lookup table.
GOOD	EXC	NO	YES	GOOD	YES	YES	YES	GOOD	YES	YES	GOOD	GOOD	GOOD	AVG	GOOD	GOOD	Slow on the TI-99/4A; has color option.
NO	NO	NO	NO	POOR	NO	NO	NO	POOR	NO	NO	POOR	POOR	NO	NO	POOR	GOOD	Covers the basics, but not much more.

separated by lines? How are wider-than-paper spreadsheets handled? Are various printers supported?

DOCUMENTATION

OVERVIEW: How well is the idea of the spreadsheet explained—its gen-

eral functions, some of its specific uses? Is its terminology defined?

TUTORIAL: The step-by-step guide

for creating a spreadsheet.

INDEX: How easily can you look up what you need?

ATARI

Since VisiCalc no longer is marketed for the Atari, owners of this computer are severely limited when it comes to choosing spreadsheet programs. Fortunately, there's **SynCalc**, an exceptional value at \$49.

SynCalc is a handsome spreadsheet package that takes advantage of Atari's superb color and its unique keyboard. It's easy to use since it's both command- and menu-driven. The program is fully compatible with **AtariWriter** (by storing the contents of your spreadsheet in a text file), **SynFile** (a data base), and **SynTrend** (a graph package), making it a nice quasi-integrated system for the home or small business.

COMMODORE 64

It doesn't take computer users long to learn that high price and high performance do not always go hand in hand when it comes to software. In the case of the Commodore spreadsheet programs included in this review, however, the two most expensive are the best—both in terms of ease of use and number of options. And, although even the highest-priced programs come in under \$100, you still can get a good spreadsheet for half that price if you do not need some of the extra functions in the larger programs.

Multiplan and **Spreadsheet** are exceptional programs. They are powerful enough for business, and still easy enough for beginners. Their options always seem to go one step further than expected.

In **Multiplan**, you can name cells so that referring to them in formulas is easier, e.g. GROSS EXPENSE. **Multiplan** can use "supporting sheets," an option that makes a cell in one spreadsheet dependent on the data in another. And, you can view eight different portions of the spreadsheet on the screen at the same time.

Spreadsheet's screen setup—alternate columns appear in different shades of gray—makes it easy to see which column you are in. One of its special advanced features is the "direction function," which lets you set up a spreadsheet for someone else to work with; you can design the sheet with built-in prompts, such as COMMISSION LEVEL?, so the user with a minimum of spreadsheeting knowledge can fill in the cells.

Swift Calc is proof that you don't have to give up performance for price. While it does not match the more expensive packages in power, it has more than enough options for home use. In addition, it is simple to use and its "pop-up" command menus are impressive for a package of this price (\$24).

Another package at the low-price end of the Commodore list is Tri Micro's **Your Home Office**. It is an integrated package—that is, both the spreadsheet and a word processor are in the computer at the same time. You can take your spreadsheet figures and PASTE them into a letter or report you are writing; in fact, the "pasting" operation is the only way you can get the spreadsheet printed.

The spreadsheet in **Your Home Office** is limited in both size and features. While you may not need anything bigger or fancier than what is provided in this package, some of its limitations may be hard to live with. The absence of on-screen prompts may slow you down as you try to recall, or take time to look up, the correct command abbreviation.

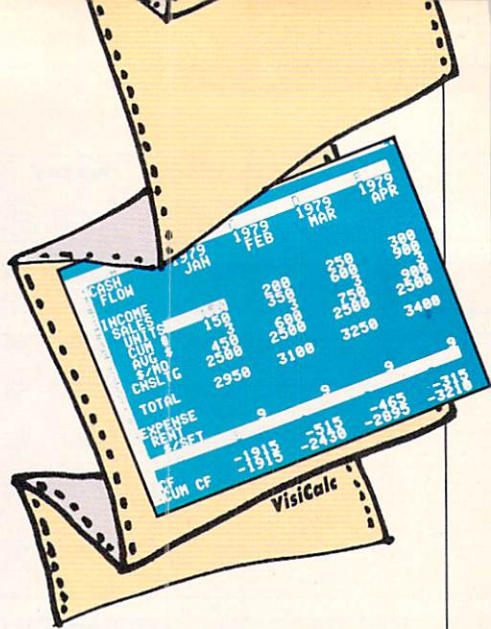
Calc Result has a special approach to spreadsheeting—it has 32 pages of spreadsheets in each package. Since the pages are, in effect, on top of each other, this lets you work in three dimensions. In addition to the usual spreadsheet intersections of rows and columns, you also can use the intersections of cells from one page to another for special calculations. There are a number of advanced features, including the ability to show four different parts of the spreadsheet on the screen at the same time. **Calc Result** definitely is a package to consider.

IBM PC AND PCjr

The spreadsheets available for the IBM run the gamut of price and abilities. Here are some of my criteria in looking them over. The ones I like best are "A.V.," or "After VisiCalc" and its clones. These second-generation spreadsheets have left the domain of long mnemonic lists of commands and rely on easy-to-read menus. They are easily formatted into handsome displays with capabilities like currency labeling, centering, and text crossover. You can reference a formula you have created by name, and then use that complex formula as a single command. These programs will store data in a format that can be translated to other applications programs like word processors or data bases. The best have the ability to create macros, which let you represent complex formula sequences with a few keystrokes.

All of these spreadsheets are consistent, comprehensive, and visually pleasing. I had to probe for their weaknesses.

The winner of my "best-for-the-buck" spreadsheet award goes to a little jewel called **My Calc**. OK, so it has a little less storage room and a few less formula and format capabilities than its big-name counterparts,



but if you want a lot of spreadsheet for a little money, take a look. Its simplicity works to its advantage, and for \$19 you can achieve some spectacular results.

My Calc has a complete repertoire of mathematical operations and functions. There's a modest on-screen tutorial (show me an on-screen tutorial that truly answers your questions when you need 'em answered and I'll eat my disk) and the program operates smoothly and efficiently. The nine-page brochure gives a tightly packed, no-frills explanation. But if you like, or need, examples and tutorials, **My Calc** is not for you.

My Calc's most serious limitations are that it is slow and it uses memory inefficiently. You have to be careful how you arrange your entries; if you mix long and short rows, or long and short columns, **My Calc** will use up more memory than you expect. Also, it won't move or copy blocks of data.

For those folks who just are not numerically inclined, Peachtree's **Home Analyst** offers a partial solution. It contains the traditional spreadsheet for those who'll want to write their own template, but it also contains two templates that can be used for common household functions.

Home Analyst makes excellent use of "pop-up" menus, which make exploration much easier. Instead of having to remember a list of alphabetical commands, you can hit ESCAPE and have a menu supply your choices.

There are a few annoying weaknesses and shortcomings in **Home Analyst**, including the fact that the documentation is inversely proportional to the difficulty of the subject—it gets sparse as the going gets tough. The difficult EXECUTE command, which allows you to merge your spreadsheet files with Peachtree's **Home Writer**, is barely discussed.

Those who need to intermingle spreadsheet data should look elsewhere.

Modeled in the *VisiCalc* tradition, **FlashCalc** uses mnemonic commands (e.g. s for SAVE) to create the worksheet format. It has more features than *VisiCalc*, consequently it has a lot of mnemonics to remember. Without any on-screen help the lists of alphabetical commands are cumbersome. A glossary would have been a thoughtful addition.

FlashCalc does include a full repertoire of built-in logical and mathematical functions, including many helpful financial ones. Unfortunately, like *Home Analyst*, it cannot share data between spreadsheets.

One powerful home spreadsheet that lets you integrate up to 15 different spreadsheets is **Perfect Calc**. You can work with sections of large files and work with as many as seven worksheets at once. An advanced feature lets you use one spreadsheet to calculate a value, and then use that value in another spreadsheet. The on-screen messages are unusually complete. Although I didn't test this feature, you can use the mouse to eliminate the keyboard drudgery of many spreadsheet maneuvers. And, you can enter formulas that are up to 77 characters long. (Only programs like *Lotus 1-2-3* and *SuperCalc* provide more formula room.)

Perfect Calc's greatest asset is that when combined with its relatives, *Perfect Writer*, *Filer*, and *Link*, you have a series of software that looks alike, acts alike, and can share data.

Another easy-to-use favorite is Microsoft's **Multiphan**. It requires few keystrokes and supplies a complete command list to guide you through your spreadsheet. Its data-sorting feature is one of the easiest I've ever used. The choices are all crystal-clear and the on-screen help is comprehensive. Another plus: Its print functions are many and varied.

In addition to being straightforward, there's a lot of power to this program. With its sorting features and many formats, it's a good package for those who work with a lot of data. Unfortunately, *Multiphan* has no graphics and is sluggish when you do split-screen calculations.

SuperCalc 3 is the natural evolution of a fine product. An enhanced version of *SuperCalc* and *SuperCalc 2*, this package adds more exciting features with each version. It lets you independently scroll your windows; track and forecast complex data; and perform sorts alphabetically, numerically, or by date (great for loan payments and personal schedules). With its "SuperData Interchange," it'll accept data from other formats so you

can use info from multiple spreadsheets and other programs like *Lotus 1-2-3* and *VisiCalc*. It can be used as a powerful programming tool to set up canned applications so that even a novice in the family can input data.

Calculation times are very fast, since *SuperCalc* only recalculates the dependent cells. It solves complex forward referencing and circular calculations in which formulas can refer to cells ahead of it as well as behind it. If you plan to do any heavy-duty tax or financial projections, this circular referencing capability is a must.

SuperCalc's graphics are remarkable and are accomplished with one keystroke. You can view graphs on your display screen or reproduce them on a plotter or printer. A sideways-printing utility included on the disk lets you achieve better-looking printed results.

SuperCalc, which can be integrated with *EasyWriter* and *SuperWriter*, undoubtedly is one of the most powerful spreadsheets on the market. Don't be dissuaded by its capabilities—this spreadsheet is surprisingly easy to learn.

Unless your name is Forbes, Rockefeller, or the like, **Creative Calc** may be one of the best spreadsheets available for your personal record-keeping. Its creativity should be praised for a number of reasons. First, it takes greater advantage of the PC and PCjr keyboards than almost any other PC spreadsheet package. Second, it most clearly defines and meets the needs of the home/personal user. Third, it strikes a balance between having enough features to make an effective package without hordes of extras you'll never require. Fourth, realizing the home user integrates spreadsheets with correspondence, the Creative people made the *Creative Calc* and *Creative Writer* packages nicely integratable. All of these, plus its very affordable price and cosmetically appealing layout, make *Creative Calc* a creative solution to the home spreadsheet dilemma.

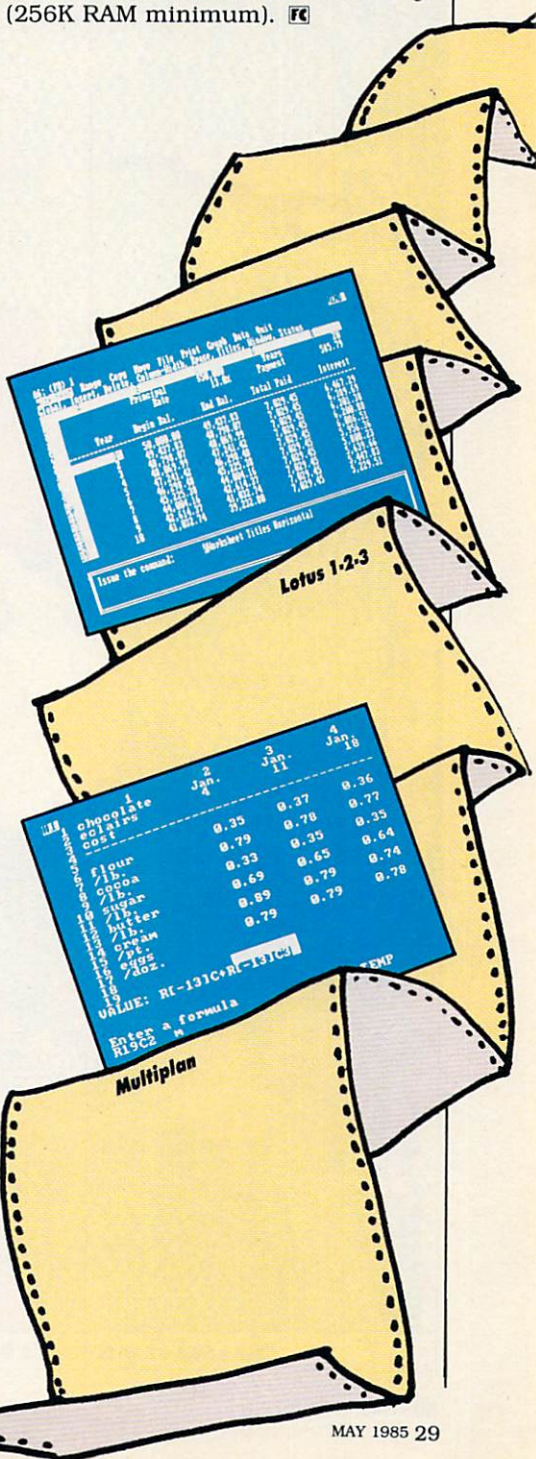
Like *VisiCalc* and Apple II in the early '80s, **Lotus 1-2-3** and the IBM PC have been a hot item in recent years. And for good reason, since *Lotus 1-2-3* is a powerful, well-designed, and remarkably easy-to-use spreadsheet.

The excellent disk-based tutorial provides a guided tour that will get you calculating in no time. The over-360-page manual is well-organized and includes a complete index. Commands to *Lotus* may be entered directly or selected from a series of easy-to-use menus. If you're using a color monitor, you'll appreciate the clever use of color highlighting on the screen. HELP screens (over 200) are

available at any time.

In addition to being a sophisticated spreadsheet, *Lotus* doubles as a data base and, to top it off, will produce a wide variety of reports and graphic charts (bar, line, and pie) on the screen and printer. Though easy to use, *Lotus* is recommended for handling more complex tasks, such as cost analysis for a small business.

Owners or prospective owners of the PCjr will be pleased to know that this program runs equally well on that machine. The IBM PCjr version comes on two cartridges. A tutorial and two utility disks comprise the rest of the package. Owners of the IBM PC version of *Lotus 1-2-3* can obtain a free "install" kit from dealers that will enable it to run on the PCjr (256K RAM minimum). **FC**



B A S I C B O O T H

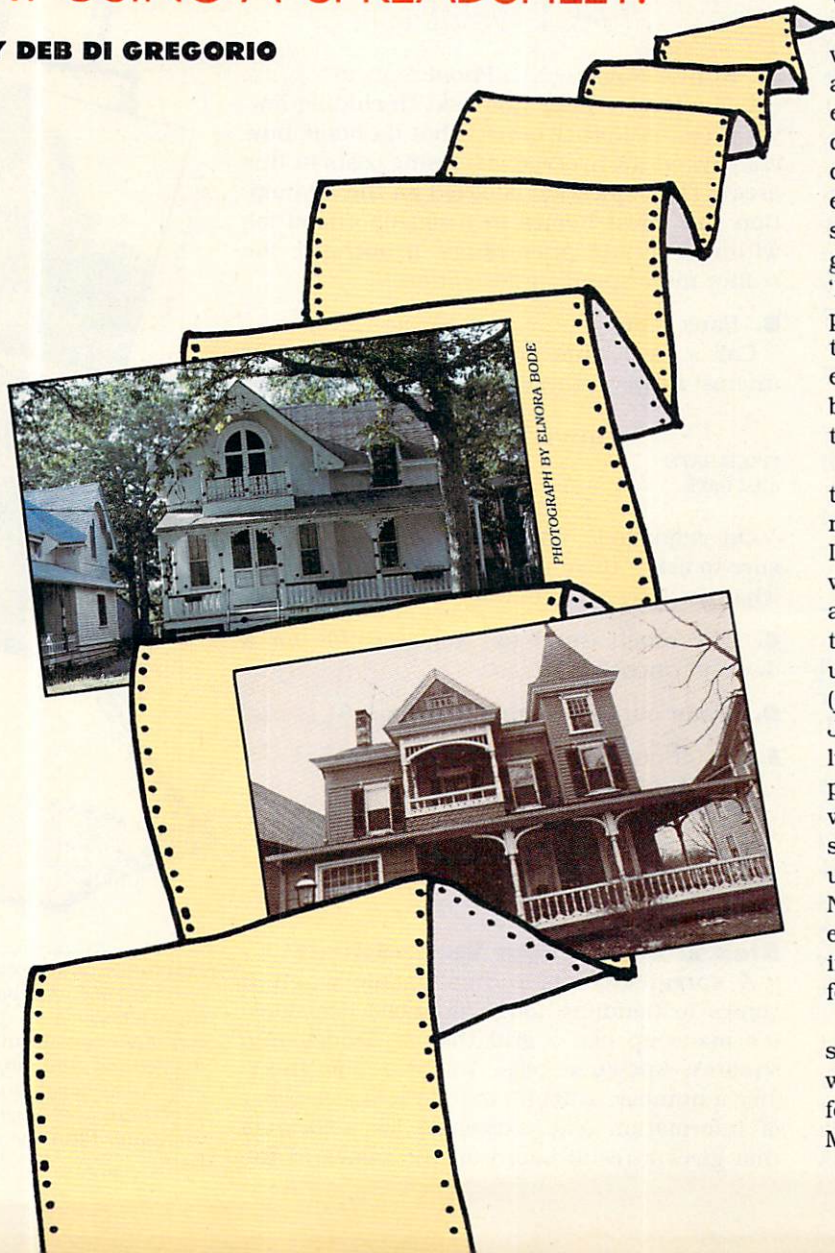


"As soon as grandma's backup circuits fizzle out and she goes to bed, we'll turn on the computer."

How to Use a Spreadsheet to Help Buy a Home

JUGGLING THE NUMBERS ON YOUR OWN WILL TAKE ENOUGH PAPER TO BUILD A HOUSE. TRY USING A SPREADSHEET.

BY DEB DI GREGORIO



PHOTOGRAPH BY ELMORA BODE

Whether it's a one-room cabin in the Adirondacks or a turreted Bavarian palace, buying your new home sweet home can be everything *but* a sweet experience. Fluctuating interest rates, dozens of different mortgage options, figuring out just what you can afford . . . it all makes for a lot of research and many hours of work. Your computer can help! It can help figure out what you can afford—and once you find your dream house, it can help when you approach a bank for a loan.

Michelle and Mark Finley discovered all this back in 1981, when they wanted to buy a friend's house in Pound Ridge, New York. Although they both had successful careers—she as a swimsuit designer, he as a marketing representative—no bank believed enough in the upward mobility of the young couple (both were then 26) to give them a mortgage. So Mark sat down at his Osborne computer and designed a spreadsheet that calculated what their monthly payment would be. Then he went a step further: He projected what each of their salaries would be over the next five years.

"We were both counting on excellent job reviews," said Mark. "I figured that would mean about a 15 to 20 percent increase in income each year. So I typed each of our salaries in one column, and multiplied each column by 15 percent across five columns to show the increase each year." He made a printout, brought it to several banks, and—having a sales background—made his pitch. "I told the bankers, 'Look, it's tight now, but in five years it'll be a piece of cake,'" said Mark. The third bank he tried gave the Finleys the mortgage they wanted. Today they live happily in the house they bought; Mark's salary projections were right on target!

My problem was a bit different, but also illustrated how valuable a computer can be. I had no house in mind. In fact, I didn't even know if I could afford a home of my own. A freelance writer, I work from my living room—one half of a cramped, two-room apartment. I would love to have a home with a *real* living room (one used for living) and an extra room for an office (just for working), but rents in my neck of New Jersey run close to \$1,000 a month for such a luxury! While pondering the horrible idea of pouring all that money into rent, I began to wonder whether it was possible to turn my sweat-laden dollars into equity, instead. A minute later I was on the phone with my mother. No, not for a loan! She's a crackerjack real-estate salesperson, and she gave me a lot of information about mortgages, including the formulas banks use to qualify people.

After more research, I eventually developed a spreadsheet with my *VisiCalc* program that would help me see just how much I could afford. The results were very similar to what Mark Finley produced with *SuperCalc*. Al-

though the instructions included with this article are for *VisiCalc*, you should be able to adapt them to your spreadsheet.

SORTING OUT THE HIDDEN COSTS

Buying a home is more expensive than it sounds. There are costs which, while not exactly "hidden," probably won't be anticipated by novice home buyers. After scraping together every last penny for the down payment, unwary home buyers discover, to their horror, that some of that cash will have to go towards closing costs. And that usually includes wallet-slimming "points." A point is 1 percent of the loan. A bank will charge anywhere from one to four or more points for a residence. Generally the trade-off is: The more points you pay, the lower the interest rate. Unless you have a chunk of money set aside for that purpose, it will end up coming out of your down payment, lowering it and possibly lowering the amount of money you can spend on your new home.

Another shock to many novices is the monthly mortgage payment. When calculating your eligibility for a mortgage to the bank, remember that your monthly payment will include not just your payment on the mortgage, but also monthly taxes and insurance. A general rule of thumb that many experts cite is: The entire monthly payment should not exceed 28 percent of your gross monthly income. And the monthly mortgage payment *plus* your monthly payments on other loans should not exceed 36 percent of your gross monthly income in order for you to qualify for a loan (although some lenders may be a little more flexible). In this article, we'll use these percentages as working numbers.

Finally, there are all those different *types* of mortgages! For example, ARMs (Adjustable Rate Mortgages) are attractive because you may be able to get a lower interest rate. But watch out, when the interest rates go up, so will your monthly payments. Fortunately, you can send away for helpful information (*see box*) to explain some of the details.

To help clear up all the confusing factors—figuring a percentage of my gross income, charting ARMs, interest rates, points, etc.—I pulled all the mathematical elements together on a worksheet. Many could only be estimated; taxes and insurance vary from home to home, closing costs from lawyer to lawyer, and points from bank to bank. Therefore, before I could plug any numbers into my spreadsheet, I had to do some preliminary research. I had to make a few phone calls to a local realtor and a bank to get some ballpark numbers. I also had to gather facts on my income, other monthly debts, and the cash I could assemble for the down payment.

I made a list and called it my Fiscal Fact Sheet. Once it was complete, I went to my computer and plugged the numbers into the right places on the spreadsheet. This project is *not* the definitive answer on whether or not a bank

will give me a mortgage—bank policies differ; some are more flexible than others—but it gave me an idea of where I stood. Once I start house-hunting, I can plug in the actual numbers and get a more accurate idea of what my monthly payments will be. If you follow the instructions in this article, you, too, should be able to get a better idea of what you can afford—and how to juggle the numbers to make the home of your dreams more of a reality.

SIX SIMPLE STEPS

Here's how to estimate the price of the house that you can afford. It's easy when you break it down into six steps!

Step 1: Preliminaries

Gather the needed numbers. Because closing costs and interest rates vary, you'll have to do some research. You can compile all your information to look something like the worksheet below. (Why not use your word processor and **SAVE** the information?)

FISCAL FACT SHEET

A. Realtor Name _____ Phone _____ \$ _____

Call a local realtor and ask: "Including lawyer's fees and other costs, what do home buyers pay, on the average, in closing costs in this area?" (This question is based on the assumption that most homes in a neighborhood fall within a certain price range. If not, give the realtor more-specific information.)

B. Bank Name _____ Phone _____

Call a local bank and ask: "What are your interest rates on these 30-year mortgages?"

	WITH 10% DOWN	WITH 20% DOWN
FIXED RATE:	_____ %	_____ %
ARM RATE:	_____ %	_____ %

On Adjustable Rate Mortgages (ARMs), be sure to ask if there is a ceiling on the rate and what the interest rate range is.

C. How much can I (or we) assemble for a down payment? \$ _____

D. My (or our) gross annual income: \$ _____

E. My (or our) other monthly payments:

Car loan \$ _____
Credit cards \$ _____
Other loans \$ _____
Total monthly outlay \$ _____

Step 2: Create Your Spreadsheet

A spreadsheet is indispensable when it comes to handling tough financial decisions. It's made up like a grid that is divided into squares, known as cells. You can type in either a number, a "label" that defines a category of information (e.g. **EXPENSES**), or a formula that gives a result based on the values in the

PHOTOGRAPH BY ELMORA BODE

Freelance writer DEB DI GREGORIO of Ridgewood, New Jersey, is a computer consultant and editor. She wrote last July's cover story, "Celebrate! Let Your Computer Plan the Party."



MY SPREADSHEET

KEY

→ means press the right arrow key (or your equivalent).

> means "Go to." (For example, > A16 means go to cell A16. You can also use your cursor control keys.)

® means hit the RETURN or ENTER key.

First, type /GC30 to set GLOBAL COLUMN WIDTH to 30 characters. Now you can begin.

- >A1 ® Mortgage Spreadsheet ®
- >A3 ® A. Cash I can assemble: → /FS ®
- >A4 ® B. Estimated Closing Costs: → /FS ®
- >A5 ® C. Available down payment: → /FS+B3-B4 ®
- >A6 ® D. House I can afford: → /FS+B5/.2 ®
- >A8 ® E. Down payment percentage: → +B5/B6*100 ®
- >A10 ® F. Loan Required: → /FS+B6-B5 ®
- >A11 ® G. At an interest rate of: ®
- >A12 ® H. For how many years: ®
- >A13 ® I. Est. monthly loan payment: → /FS+B10/((1-((1+(B11*.01/12))^(B12*12)))/(B11*.01/12)) ®
- >A14 ® J. Est. insurance and tax: → /FS+B6*.0125/12 ®
- >A15 ® K. Est. total monthly payment: → /FS+B13+B14 ®
- >A18 ® Can I qualify? ®
- >A20 ® My monthly payment should be 1 → ess than or = to 28% of my ®
- >A21 ® gross monthly income. ®
- >A23 ® L. My gross annual income: → /FS ®
- >A24 ® M. 28% of my monthly income: → /FS+B23*.28/12 ®
- >A25 ® N. My est. monthly payment: → /FS+B15 ®
- >A27 ® My monthly payment plus my oth → er monthly debt payments ®
- >A28 ® should be equal to or less tha → n 36% of gross monthly income. ®
- >A30 ® O. Other monthly debt payments: → /FS ®
- >A31 ® P. Total of monthly payments: → /FS+B30+B25 ®
- >A32 ® Q. 36% of my monthly income: → /FS+B23*.36/12 ®

other squares on the grid. The following instructions (see *My Spreadsheet*, left) will program your *VisiCalc* spreadsheet. Once you've typed in these commands, you'll move around filling in labels, numbers, and formulas as needed. For example, in the left-hand column of this spreadsheet, you'll see one label that says CASH I CAN ASSEMBLE (for a down payment). The cell directly to the right will be blank, allowing you to input the amount of money you can gather. In some of the other right-hand column cells, you will type in a formula that will automatically compute the answers.

It's easy! Just follow the instructions carefully, and your spreadsheet will be ready to go! Don't be alarmed if you see the word ERROR in several cells; it will disappear when you plug in the numbers in Step 3.

Step 3: Plug in the Numbers

Now that you have created your spreadsheet, plug in the numbers from your Fiscal Fact Sheet and see how this project can help you figure out if (and how) you can afford to become a homeowner.

A. CASH I CAN ASSEMBLE: Type in the correct amount.

B. ESTIMATED CLOSING COSTS: Again, use the figures from your fact sheet. Remember that if you discover that you can afford a lot more or a lot less than you thought you could, and want to look at homes in a different neighborhood, double check with a local realtor to readjust the estimated closing costs on a home.

C. AVAILABLE DOWN PAYMENT: The spreadsheet program subtracts the closing costs from the amount that you can assemble, to figure the amount of your down payment.

D. HOUSE I CAN AFFORD: The computer calculates the approximate cost of your new home by dividing the down payment by 20 percent (or .2). In other words, the amount of your down payment is 20 percent of the total amount that you can afford to spend on a house. If, for instance, you want to buy a more expensive house and want your down payment to make up 15 percent of the total cost of the house, simply move the cursor to cell B6 and type in (+B5/.15). For 10 percent, change .15 to .1, and so on.

E. DOWN PAYMENT PERCENTAGE: This figure is set off to keep it in easy view, since some banks require that you purchase special insurance if the down payment is less than 10 percent. Later, when you know the exact price of the home you want, the program will calculate what percentage of the total cost of your home your down payment has to be.

F. LOAN REQUIRED: The spreadsheet subtracts the down payment from the total cost of the house to calculate the amount of the loan.

G. AT AN INTEREST RATE OF: Type in the interest rate from one choice on your fact sheet. Some

DEMYSTIFYING MORTGAGES

A free pamphlet, *Charting Mortgages*, describes a dozen or so of the most popular types of mortgages available. Write:

Consumer Affairs

Federal Reserve Bank of Philadelphia
P.O. Box 66
Philadelphia, PA 19105

That same office offers two other free pamphlets: *The Rule of 78's* or *What Happens When You Pay Off a Loan Early* and *Truth in Lending Simplified*.

Information also is available from:
U.S. Department of Housing and Urban Development
Office of Public Affairs, Room 10132

451 Seventh St. SW
Washington, D.C. 20410

For free pamphlets that may help clear up the confusion of Adjustable Rate Mortgages, contact:

Consumer Handbook on ARMs

Publications Services

Mail Stop 138

Board of Governors of the Federal Reserve System
Washington, D.C. 20551

What You Should Know About ARMs

Mortgage Bankers Assn. of America

P.O. Box 65081
Washington, D.C. 20035

loans require a large down payment. If that is the case, be sure that the down payment percentage required matches the one that you are using in Step D.

If you are willing to take an ARM, this is where you'll want to experiment with some different interest rates. Some ARMs have a cap—for example, the rate starts at 12 percent but can go no higher than 18 percent. Type in the number 12 and look at the estimated monthly payment in line 1. Now type in 18 and see what happens to the monthly payment. *Ouch!*

H. FOR HOW MANY YEARS: Type in the number of years (usually 30).

I. ESTIMATED MONTHLY LOAN PAYMENT: The spreadsheet amortizes the loan for you and calculates the monthly payment.

J. ESTIMATED INSURANCE AND TAXES: The spreadsheet calculates the estimated insurance and taxes on your new home by multiplying the price of the home by 1.25 percent and dividing it by 12. This will give you a *ballpark estimate* of what your insurance and taxes will cost you each month. I can't give you a hard-and-fast percentage for computing this, since taxes and insurance costs vary greatly from area to area.

K. ESTIMATED TOTAL MONTHLY PAYMENT: The total is estimated by adding tax and insurance costs to the monthly loan payment.

L. MY (OUR) GROSS ANNUAL INCOME: Type in the number from your fact sheet.

M. 28 PERCENT OF MY (OUR) MONTHLY INCOME: The spreadsheet calculates the figure.

N. MY (OUR) ESTIMATED MONTHLY PAYMENT: Compare your estimated monthly payment with 28 percent of your income—your monthly payment should be the same, or less, to qualify for a mortgage. But hold on, you're not home yet . . .

O. OTHER MONTHLY DEBT PAYMENTS: If you have other monthly loans to pay off, type in the amount from Section E on your fact sheet.

P. TOTAL OF ALL ESTIMATED MONTHLY PAYMENTS: Your other monthly payments are added to your monthly house payment to give you a grand total monthly outlay.

Q. 36 PERCENT OF MY (OUR) MONTHLY INCOME: The spreadsheet calculates 36 percent of your monthly income. Your total monthly outlay should not exceed 36 percent of your monthly income.

Step 4: Juggle The Numbers

If you've used a spreadsheet before, you know that one of its great features is being able to change all those numbers at the touch of a button. So, be sure to take advantage of that. Use the spreadsheet to play the game of "What if?" and to arrange different scenarios. Suppose you could come up with a larger down payment? What if interest rates change? What if you borrow the money for a longer term? What if you find a better-paying job? What if you pay off your car loan more quickly and thus increase your buying power? Suppose you buy a house in an area where the tax rate is lower? What if you win the lottery? These and other questions are easy to ask—and easier to answer with the help of a spreadsheet.

Step 5: When You Find the House You Want to Buy . . .

Once you've decided to take the plunge, you can get the following numbers from a realtor or the home's current owner, and plug them directly into the spreadsheet. In the cells where you plug in the numbers, the formulas will disappear—don't worry, if you need them again, just go back to Step 2 and type them in! (Or, if you save your original spreadsheet on a disk, then you can simply call it back up and start over.)

B. CLOSING COSTS: Once you know the actual price of the house and the number of points your bank will charge for the loan, you can plug that number in here.

D. APPROXIMATE COST OF NEW HOME: Add in that magic (and sometimes negotiable) number.

J. ESTIMATED INSURANCE AND TAXES: The home's current owner or realtor will supply these figures. If they're annual, divide by 12 and type in that number.

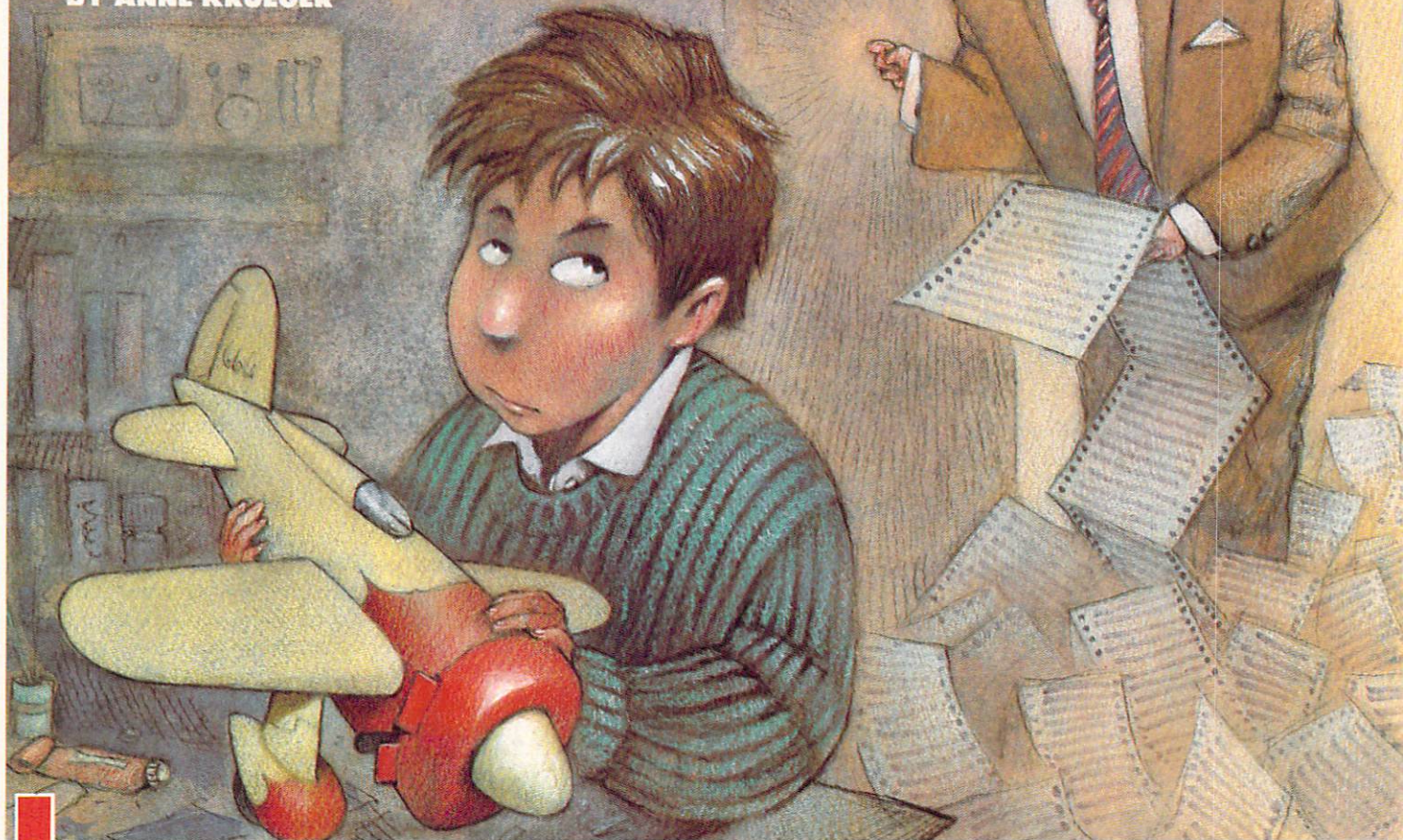
SURPRISE!

When I used this spreadsheet, I was sure I couldn't afford a home. And, as I plugged in each number, I saw that I was right. But I didn't give up. I shopped for a bank with a lower interest rate and took on extra work to pay off some of the principal on my other loans. Once I juggled the numbers and put in the changes, I discovered, to my surprise, that I *could* afford a house—something a little larger than a one-room Adirondack cabin, and just a bit smaller than the servant's quarters behind a turreted Bavarian palace, but someplace that would suit me just fine. **E**

BIZ KIDS

TEENS TAP COMPUTER KNOW-HOW TO TAKE CARE OF (FAMILY) BUSINESS

BY ANNE KRUEGER



If you've been wondering how a computer can work for you, ask your in-home experts—your kids. They can use their computing skills for much more than zapping aliens. In fact, with their know-how and your family computer, you may be able to turn typing skills into a home business, learn how to organize files at the office, or get that community-workshop mailing list into shape. Check out the following success stories for inspiration. If you're still leary about having your kids help you integrate the computer into your life or job, have them read "Tips for Teaching" or "Combating Parents' Fears" on the following pages.

Janet Hecker, 50, calls her 19-year-old son, David, "a walking encyclopedia." Without him, she claims, not only would she never have touched a computer, she wouldn't have had the nerve to "computerize" her home secretarial business.

"The computer has helped me tremendously," Janet says. "I used to use a typewriter and do accounting the old ledger-book way. I couldn't carry the workload I do now without the computer."

Things weren't always so rosy in this Cocoa

Beach, Florida, home. When David, then 14, got his Apple II plus in 1981, Janet was "mad at it," David remembers. "She didn't like the fact that I was sitting down at the end of the hall looking at it all the time. She was wary of computers, as many people are. I think she had some idea that computers would take her job or something."

"I kept saying, 'This spreadsheet will help you with this. You could use this.' But she wouldn't listen," David says.

"He used it all that first summer and kept telling me about it, but I didn't get involved," Janet agrees. "I couldn't believe it would help me." She felt comfortable with her old typewriter, and thought if she failed at something new, "my kids would think I was a dummy!"

It took a program called *VisiCalc* to change Janet's mind. "She saw *VisiCalc* and realized some of the things she could do with the computer," David says. "At first she'd just sit with the manual and yell when she had a problem. She'd count on me to demonstrate the programs when she got stuck."

"He was really pleased that I was interested," Janet says. "He'd show me what the computer

ANNE KRUEGER is a senior editor for FAMILY COMPUTING and edits the K-POWER section for kids each month.

BATTLING PARENTS' FEARS

You know there are ways the computer could help your parents at home or in the office. But they seem a little reluctant to tackle computing. In fact, they're full of excuses! And when it comes to learning about computers, their excuses are pretty bad. Here are sharp answers (recommended from authorities their age) you can offer the next time they try to get out of their first computer lesson with a dumb excuse.

When your parents say, "I'm too old . . ." try quoting Sheldon Dressler, a New York City Gray Panther: "If you resort to that kind of self-criticism, you're hiding behind something and also making a comment about older people in general. It shows a lack of confidence."

If your parents dare to say, "It's easier to use a pen and paper," try out your Rosemary Rogers quote (she's the author of nine bestselling paperback novels): "It's easier with a word processor. You can see the page and correct something without whiting it out and blowing on it to dry. And you don't have to retype the whole page when you make changes. I just read the manuals and did it. My computer is fantastic—now I can't do without it."

When your parents say, "I'm afraid I'll break something," tell them "Pshaw!" According to Commodore public relations coordinator Susan West, "The only way is if they punched it or dropped it on the floor, or knocked it off the table. Someone would have to be pretty violent."

And when they try that age-old excuse, "I'm no good at math," here's an answer for you: "Who said we were going to ask you to do math? The main skill you need is just being logical—just thinking about how to solve a problem, such as: How to get to grandmother's house at 5:30 on a Sunday evening." Joyce Hakansson, a computer educator and software developer, said that.

Everyone's heard of the psychologist and columnist Dr. Joyce Brothers. So when your parents lament "What do I need to learn this for?" tell them the Doc says, "Because it's there and it's going to be part of your child's life and you should learn about it if you don't want to be closed out."

Better yet, tell them that if they want to cut down the amount of time they spend typing, they should try a word-processing program. If they want to organize names or supplies or a mailing list, or anything, a computer data base will do wonders. Tell them a spreadsheet will whip their accounts into shape. And tell them you know how to do all that computer stuff and that you'll give them a good deal . . . how can they resist?!

—MARC BERMAN

**"WHEN I SAW A
14-YEAR-OLD
COULD USE A
COMPUTER,
I KNEW I COULD,
TOO!"**

could do and then would go off to school. When he got home I'd show him how smart I'd become and what I could do. He was proud, but then he'd say, 'It's my turn now!'"

Besides *VisiCalc*, Janet uses a word-processing program called *Magic Window*, data bases called *pfs: File* and *pfs: Report*, and a special program David has written for her in BASIC that makes her typewriter compatible with her computer.

"One of her biggest clients is a real-estate firm," David explains. "She has to run off a lot of forms which have lots of blocks and grids that need to be filled in. We interfaced her typewriter with the computer. My program lets her enter the information and then move on to the next block without her having to space ahead or roll the typewriter carriage forward. She says it's saved her lots of time."

Now that David is off studying computer science at Florida State University in Tallahassee (he got a Macintosh; she kept and expanded the Apple II plus system), Janet's without her in-home demonstrator. "But she still calls long-distance every now and then and says 'Help!'" David reports. "And I'm glad to give it."

COMPUTER JOINS ACTING TROUPE

Anton Kozhevnikov, 13, is used to helping his family. Since he and his mother, Olga, and father, Yvgeny, left Russia six years ago, the close-knit family has depended on one another for emotional support—first in Berkeley, Cali-

fornia, and now in Los Angeles.

In their early years in America, Anton's quick grasp of English made life easier for the Kozhevnikovs. And since Anton was 7, he's been his actor parents' behind-the-scenes man; in March he controlled the sound and lighting for their new clown/gag play, at the Variety Arts Center in Los Angeles, called "The Wrong Way Around."

Recently, Anton found a new way to help his family—by using his computer. A bar mitzvah gift from friends, Anton's Atari 800XL system was speedily put to work. He quickly mastered the word-processing program *AtariWriter*—and within days put the Kozhevnikovs' mailing list on computer. "My father wants me to use programs about math and science, but I also want to help the family. I print out letters for them that go to theater groups."

The mailing list is an important part of the Kozhevnikov mission: telling others about their lives as "refuseniks"—Russians whose request to emigrate was turned down by Soviet authorities. Before they finally were allowed to leave the Soviet Union for Israel, Olga and Yvgeny put on thousands of underground theater performances of their story, which brought them worldwide fame. In America, Anton's Atari is helping to keep their story of freedom alive, and is saving them the money it would cost to have someone else print the letters.

"Anton is a very big help, but the computer is quite a complicated thing," Olga says. She admits that she is happy to stay away from the computer and let Anton "work on his many projects."

Money is scarce for the Kozhevnikov family (Anton has a 2-year-old sister, Mascha), so Anton tries to organize family funds with his Atari, too. He keeps track of the plays his parents write or perform, the work they do for Russian radio, and the hours his father spends driving a taxi. In his spare time, he has taught himself BASIC, Logo, and Pilot, and is writing a long program about the human body.

HOME IS WHERE THE HELP IS

"My daughter taught me," Carol Bronz likes to tell people when she's discussing computers. "When I saw a 14-year-old could use a computer, I knew I could, too!" At first Carol wanted nothing to do with computers. But after her three kids got a computer, she was more or less forced to find out about them.

"We bought an Apple IIc for the kids because the other kids in the neighborhood had computers. I had no intention of getting involved with this, and my husband, Joel, certainly didn't want to get involved. But then we bought another IIc for my husband's office, and I felt I had to use it."

Once she felt that pressure, Carol who's a nurse several nights a week and does secretarial duty in her husband's Manhattan design office, decided her own Westport, Connecticut, home was the best place to look for help. "When

I first put in the disk, I didn't know you had to switch to another data disk; I didn't know anything. My 10-year-old son, Ryan, had to show me how to turn the thing on!"

Eventually, Carol told her daughter, Kimberly, that she needed to learn *pfs: Write* (a word-processing program). "Kimberly didn't even read the manual, she just turned the computer on and started working," Carol marvels. "Kids don't mind trying and failing and trying and failing—I don't like to do that!"

Kimberly, who uses the *Ilc* to type letters and do homework, at first thought her mother automatically should know more than she did on the computer. "But then I realized I had some background from a computer class I took that she didn't have," 14-year-old Kimberly says. "I worked with her a little bit each night and was able to show her how to start the programs. It did feel a little strange teaching a parent!"

But not to Carol, who says, "It's great learning from your kids. It's such a relief to have someone right here who can help me. My daughter is a good teacher and I can ask her stupid questions. She made me feel confident."

So confident, that Kimberly and Carol are tackling *pfs: File* next so Carol can create a data base at work, as well as use the computer to word process.

TEEN PUTS ON 'TEACHER'S HAT'

In the Thomas family, it was the parents who introduced the computer into the family. Glen and Dianne Thomas decided to buy a computer to help run their businesses—a hotel called Riverside Lodge (where they live), and the statewide Thomas Construction Co.

For 17-year-old son David Thomas (who was having trouble finding enough to do in hometown Moore Haven, Florida), "the day the computer arrived" was one to remember. "They were just talking about buying one, and went out to look around," David recalls. "All of a sudden, they came back with this system—a Morrow Design Micro Decision." As is the case with many uneducated computer owners, the Thomases plunked it down in the hotel's office . . . and it just sat there.

"It turned out to be a lot more complicated than they thought when they brought it home," David explains. "It sat around for more than a month and no one even got close to it. They didn't know what to do with it." After one look at the computer, David was hooked. He bought and devoured computer magazines, studied programming books, and finally was courageous enough to check out the software that came with the system.

"I started fooling around with the computer's Microsoft BASIC, and then I taught myself *WordStar*—the word-processing program that came with it. At first Mom didn't want me to touch it because she thought it was delicate. But once I could show her I knew what I was doing, she didn't mind."

TIPS FOR TEACHING

David Thomas had no trouble at all getting his mother, Dianne, enthused about using the computer in their real estate/hotel office. But not all parents are so inspired. Many are afraid they won't succeed. So, in your new role as educator, it always pays to go easy on anyone you're helping. Here are some do's and don'ts.

Don't tell them they're dumb or slow or how quick you learned it, or how quick your friend or your little brother or sister learned it.

Don't give them something tedious (like equations with sines or cosines) or something where they won't see much happen.

Don't use a techie vocabulary. They don't need to know what RAM, ROM, or hexadecimals are. All they need to know to begin, is what to press or turn.

Don't expect them to remember long commands or programs. Give them instructions one at a time.

Don't hog the controls.

Don't laugh at them. They're your parents and they can still have the last laugh!

Do show them things they're interested in, especially programs they'll see an immediate need for at home or around the office.

Do develop a feel for the pace of your students. If they're interested in something, don't cut them off. If they're already familiar with a typewriter, start with a simple word-processing program.


Do be aware of how much tolerance your parents have for frustration. Don't push them to do too much too fast.

Do be patient. Remember how klutzy you felt the first time you had to try something new.

—M.B.

David's mother, who had nightmares of the computer never being able to do the tasks they'd bought it for—bookkeeping, billing, construction bids—was more than happy to get help from her son "once I convinced her [the computer] wouldn't bite her!" David says. "At first I would just set up the word-processing program for her, she would do her typing, and then I'd have to close it out for her. Now she can do it all herself."

Using another program, called *MailMerge*, David showed his mother how to personalize thousands of letters at a time. Then they moved on to learning how to print out checks, forms, and contracts, and use the computer and software called *Personal Pearl* to make proposals and bids, and keep track of household mortgages. "Mom was amazed at how easy it [using the computer] was once she got over the block she had about it," David says. "I don't know what my parents would have done if I hadn't become interested in the computer. No computer classes are offered around here in computer literacy or use. The thing would have become an unused relic."

"All of this has turned me into a computer fanatic," David laughs. He now has his own Commodore 64 setup and is talking of going to college to get a degree in Computer Education. And since his success with his mother, David has tried on his "teacher's hat" with almost anyone he can find around Moore Haven. "Unfortunately, not too many kids around here are into computing," he laments. "But the computer teacher at school does tell other kids to 'Go ask David' if they have a computing problem." In the meantime, David has moved on to computerizing the marina where he works to earn money for software. 

"I DON'T KNOW WHAT MY PARENTS WOULD HAVE DONE IF I HADN'T BEEN INTERESTED IN THE COMPUTER."

BUYER'S GUIDE TO PORTABLE COMPUTERS

LIGHTWEIGHT AND WITH BUILT-IN SOFTWARE, PORTABLES ARE PERFECT FOR THE TWO-COMPUTER PROFESSIONAL



EPSON'S GENEVA

NEC'S STARLET

SHARP'S PC-5000

SORD'S CONSULTANT

TRS-80 MODEL 200

HP'S PORTABLE

BY DAVID WILSON

Years ago, Alan Kay, a computer scientist/futurist who now works at Apple, conceived the idea of a computer that would 1) have a large memory, 2) use a "natural" language and operating system that anyone could work with easily, and 3) be about the size of a standard notebook.

The "notebook" computer as conceived by Alan Kay is not with us yet—but we're getting close. And portables now on the market can make for some nice moments.

Last summer, for example, in Nova Scotia, when I was deep into writing course descriptions for the coming school term, I watched a mink, a small fish in its mouth, move toward me and then under the bridge on which I was sitting. Not for the first time, nor the last, was I grateful for my Epson laptop computer, which allowed me to work in Nova Scotia's natural surroundings, under an open sky, miles away from paved roads, electricity, telephones, or ceramic plumbing. And because I completed my course-planning there, as I sat on the bridge, I was able to add a couple of days to my vacation—a spectacular bonus.

There is nothing unique about my use of this portable—aka notebook, laptop, or briefcase—computer. Journalists, salespeople, appraisers, students, contractors, athletic coaches, and others all have found uses for these totables. They are ideal for people who already own a computer—they are able to perform many tasks just as well as desktops, with the advantage that they can be used almost anywhere since most run on batteries. Freedom is not having to find an outlet whenever you want to work.

LAPTOPS:

Advantages

- Battery-operated
- Built-in software
- Nonvolatile memory
- Modem often built-in

Disadvantages

- Expensive external disk drives
- Poor sound
- Monochrome LCD screen displays
- Software selection limited

People refer to portables with different terms. The term "laptop" aptly describes where you can use them, and "briefcase" describes where you can put them. "Notebook" describes their shape. All but two computers in our chart weigh less than 10 pounds. Both the Apple IIc and the Apricot are a little too big to put on your lap or carry in a briefcase and do not contain batteries. Thus, they're better called "portables" (as distinguished from "transportables" or "luggables," which usually weigh more than 20 pounds and are not designed to be moved frequently). None of these terms really gives the full picture. Portables are not second-class computers; they are not gimmicks.

Memory. Notebook computers have anywhere from 8K

to 512K of RAM; most can hold at least 64K. Unlike the RAM you'd find on, say, a Commodore 64, this usually is "nonvolatile" RAM. That is, when you turn the computer off, the contents of RAM are retained under battery power, and will be found next time you turn the computer on. Thus, while you can connect cassette recorders and disk drives to most portables, most of the time they don't need to be hooked up. And some portables come with built-in disk drives or tape recorders.

Software. Most laptops have built-in applications software that can be accessed from an on-screen menu that appears when you turn the computer on. Word-processing software is standard (the Epson Geneva and the NEC PC-8401A include versions of the best-selling *WordStar*), and built-in spreadsheets are becoming more common. The HP-110, for instance, has the classic *Lotus 1-2-3* built in; the TRS-80 Model 200 has *Multiplan*. In addition, most portables have some kind of filing/data-base/address-book software built-in.

Many notebook computers use standard operating systems, such as MS-DOS or CP/M. In theory, this means there should be a large amount of third-party software available. But, since many have nonstandard screen displays (less than the normal 24 × 80), do not have color capability, and/or use 3.5-inch disk drives, you may have trouble finding software in the proper format to work on your portable. Check carefully; assume nothing!

The TRS-80 and NEC laptops have sold well, and the Olivetti is quite similar in look and operation, so you will probably be able to find third-party software for them. You can, for instance, buy *VisiCalc* on a "ROM pack" (a little cartridge you plug into the computer) for the Model 100.

If your portable and your desktop have compatible operating systems and display and disk formats, you can use the same software with both. But portables can exchange text files with almost any computer through a modem.

Modems. The many portable computers that also include built-in 300-baud modems have communications software on-board. The value of this hardware/software combo is that you can travel around doing your work, then send files back to a main office, or even to your own desktop computer.

Centronics-type parallel ports and RS-232C serial ports are standard on most portables, so you can connect the printer of your choice, and/or a 1200-baud modem.

Screen display. Portable computers rely on Liquid Crystal Display (LCD) screens, which require good lighting in order to be viewed. A year ago, it was rare to find a portable with an 80-character-wide display, but now it's common. Also, many LCD displays have expanded from eight lines to 24, so that you get the same size screen display as on a desktop. The new Flat Panel Display for the Apple IIc (\$599), which turns the computer from a desktop into a portable, is an example. However, some LCD dis-

DAVID WILSON regularly writes reviews for FAMILY COMPUTING on his Epson Geneva notebook computer.

plays can be difficult to read, especially if you have less-than-eagle eyes.

It's possible to connect many notebooks to regular monitors, and some even have color output. Check for details on a CRT interface if you want to try this.

PURELY PERSONAL

Of the laptop-computer users I spoke with, none had bought the unit as a first machine. Everyone seemed to have selected the laptop as a "peripheral" to some other computer on which they had come to depend, but could not cart around conveniently. Most of these people came to

depend on their laptops extensively, and some even use the laptops more than their primary computers.

One reason for this is that laptops are truly personal computers. Your files are stored inside, and are visible when you turn on the machine. It's more immediate and real than pulling out a disk and booting it up. As a woman I met at a conference said to me: "The thing about this machine is that it's really mine. Nobody else uses it the way we all use the IBM at the office. Only I use this one, and that makes this a much more personal machine. I have typed things on the keyboard of this machine that I would never dare to type on the IBM." **FE**

15 POPULAR PORTABLE COMPUTERS

MANUFACTURER	MODEL	PRICE ¹	WT (LBS.)	TEXT DISPLAY ²	RAM (STAND./MAX.)	CASSETTE/DISK DRIVE	OPER. SYS.	BUILT-IN MODEM? ⁴	SOFTWARE INCLUDED ⁵
UNDER \$1,000									
Docutel-Olivetti 5615 Highpoint Road Irving, TX 75038 (800) 527-1179	M-10	\$799	4.2	8 × 40	8K/32K	Opt. cass.	Prop. ³	N	B, wp, cm, sc, ad
Epson America, Inc. 2780 Lomita Blvd. Torrance, CA 90505 (800) 421-5426	Geneva, PX-8	\$995	5	8 × 80	64K	Microcass.; opt. 320K 3.5" drive	CP/M	N	B, sc, Portable WordStar/Calc
Epson America, Inc.	HX-20 (w/ built-in printer)	\$795	4	4 × 20	16K/32K	Microcass.	Prop.	N	B, wp, cm
NEC Home Electronics 1401 Estes Ave. Elk Grove Village, IL 60007 (312) 228-5900	PC-8201	\$399	3.8	8 × 40	16K/64K	Opt. 320K 3.5" drive or cass.	Prop.	N	B, wp, cm, sc
NEC Home Electronics	Starlet, PC-8401A ⁶	\$999	4.7	16 × 80	64K/96K	Opt. 3.5" dual drives	CP/M	Y	WordStar-to-Go, Calc-to-Go, db
Tandy/Radio Shack 1800 One Tandy Center Fort Worth, TX 76102 (817) 338-2395	TRS-80 Model 100	\$399	4	8 × 40	8K/32K	Opt. 320K 5.25" drive and cass.	Prop.	Y	B, wp, cm, sc, ad; opt. VisiCalc on ROM pack
Tandy/Radio Shack	TRS-80 Model 200	\$999	4.5	16 × 40	24K/72K	Opt. 320K 5.25" drive and cass.	Prop.	Y	B, Multiplan, wp, cm, sc, ad
OVER \$1,000									
Apple Computer Inc. 20525 Mariani Ave. Cupertino, CA 95014 (408) 996-1010	Apple IIc	\$1,695	13	24 × 80	128K	One 143K 5.25" drive	Prop.	N	B, intro tutorial disks
Apricot Inc. 3375 Scott Blvd., No. 342 Santa Clara, CA 95054 (408) 727-8090	Apricot Portable	\$2,495	13	25 × 80	256K/1M	One 720K 3.5" drive	MS-DOS	N	B, wp, ss, sc, gr, voice-recognition software
Data General 4400 Computer Drive Westboro, MA 01580 (617) 366-8911	Data General One	\$2,895	9.1	25 × 80	128K/512K	One 720K 3.5" drive	MS-DOS	Opt.	m, cm
H-P Personal Computer Group 935 McLaughlin, Bldg. 85 San Jose, CA 95122 (408) 293-2444	The Portable, HP-110	\$2,995	9	16 × 80	272K	Opt. 710K 3.5" drive	MS-DOS	Y	Lotus 1-2-3, Personal Applications Manager, m, cm
Morrow Designs 600 McCormick St. San Leandro, CA 94577 (415) 430-1970	Pivot	\$2,500	9.5	16 × 80	128K/640K	One 360K 5.25" drive	MS-DOS	Y	wp, cm, sc, c, pl
Osborne Computer Corp. 42680 Christy St. Fremont, CA 94538 (415) 887-8080	Osborne 3	\$3,000	9.5	16 × 80	128K/512K	Two 360K 3.5" drives	MS-DOS	Y	cm, sc
Sharp Electronics Corp. 10 Sharp Plaza Paramus, NJ 07652 (201) 265-5600	PC-5000 (w/ built-in printer, \$399)	\$1,695	9.7	8 × 80	128K/320K	Opt. 320K 3.5" dual drives	MS-DOS	N	B, wp, cm
Sord Computer of America 645 Fifth Ave. New York, NY 10022 (212) 759-0140	Consultant	\$1,495	6.5	25 × 80	80K/144K	Microcass.; opt. 1M 3.5" drive	Prop.	Y	db, wp, ss, cm; optional ROM packs available

KEY TO CHART:

¹List price for base model, with minimum RAM.

²All liquid crystal display screens. No color. Some models offer CRT interface.

³Prop. = Proprietary

⁴All built-in modems are 300 baud.

⁵Note: At presstime, the Starlet still was under development.

⁵B = BASIC

ac = accounting program

ad = address book

c = calculator

cm = communications

db = data base

gr = graphics

m = memo

pl = phone list

sc = schedule

ss = spreadsheet

wp = word processing

Sew Your Own Disk Carrying Pouch

BY ELAINE AND JOEY LATIMER



SHOPPING LIST

- 1 yard of new or used denim fabric (we used an old pair of men's blue jeans)
- Sewing machine
- Navy blue thread
- Scissors
- Seam ripper
- Stapler
- Staple remover
- Ballpoint pen
- Straight pins
- Ruler
- Tape measure
- 24 inches of ¾-inch Velcro fastening tape
- 2 packages extra-wide bias tape
- 18 inches of 1½-inch rainbow elastic
- 4-5 feet rainbow shoulder strapping
- ½ yard of fleece for padding
- 14 × 7 inches stiff cardboard for backing
- 2 metal strap rings or equivalent

H

ave you ever been en route from point A to B, with your box of disks, when suddenly the box slips from your arms and splatters its contents all over the sidewalk? We have. That's why we created the Disk Carrying Pouch. This pouch can hold several individual disks, or a box of disks, inside a padded, fortified, wraparound area that offers protection to your disks and peace of mind to you. Even the novice seamstress can complete this project in fewer than two days—for less than \$10. Here are seven illustrated sewing steps:

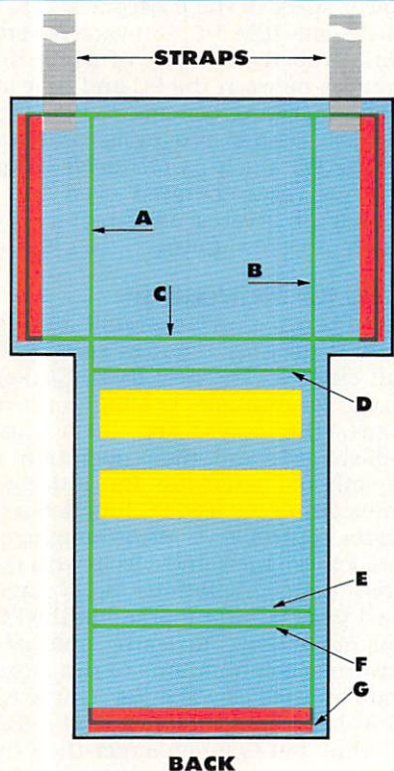
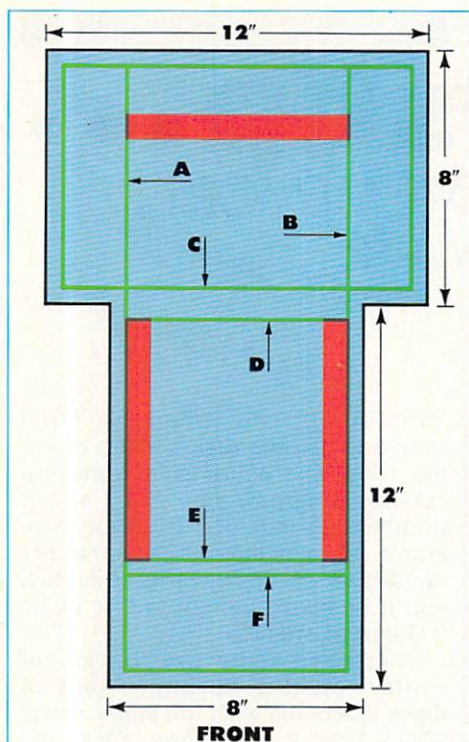
STEP 1

Iron the denim fabric until all creases and wrinkles have been removed. On the unfinished side of the fabric, measure and draw the outlines of two equal-size pieces of denim in the

shape of a large "T." (See *dimensions in diagram*.) Trace and cut out an equal-size piece of fleece for padding. At this point, you should have two pieces of denim and one piece of fleece, all the same size, and all in the shape of a "T."

STEP 2

Measure and cut one 7-inch and two 7½-inch pieces of Velcro fastening tape. To make identification easier, we used different colors of Velcro as the "fuzzy soft" pieces and the "sticky rough" pieces. Staple, then sew the "soft" Velcro to the designated locations represented by red strips on the diagram labeled "back." Measure and cut two 7-inch pieces of rainbow elastic. Fold under and sew ¼-inch seams on both ends of each elastic piece to prevent fraying. This will leave you with two 6½-inch pieces of



elastic, ready to be sewn to the other piece of denim, which is pictured in the diagram as "front." The locations where the two elastic pieces are to be sewn are shown as yellow.


STEP 3 With a ballpoint pen and a ruler, draw the sewing lines, pictured as green in the diagrams, onto the fabric. Make a "sandwich" using the two pieces of denim, with the fleece as the

"cheese." When they are lined up closely, staple them together about $\frac{3}{4}$ inch in from the edge, all around. Sew all the outer sewing lines, except the one at the bottom of the "T." Now sew the lines labeled A and B in the diagram. Remove all staples. Cut fleece around edges as close as you can get to the sewing line. Press the outer edges together and sew bias tape around the outer edge of the project. Don't put bias tape over the edge at the bottom of the "T." This edge must be left open for insertion of the cardboard backing.

STEP 4 Measure and cut two $6\frac{3}{4}$ x $6\frac{3}{4}$ -inch pieces of stiff cardboard. Insert the first piece of cardboard all the way to the square area at the top of the "T." Sew the lines labeled C and D in the diagrams to separate the first piece of cardboard from the second piece. Insert the second piece of cardboard into the opening until it pushes against sewing line D, and then sew the E, F, and edge lines at the bottom of the "T," labeled G in the diagram.

STEP 5 Measure and cut one 7-inch and two $7\frac{1}{2}$ -inch pieces of "sticky" Velcro. Staple, then sew these at the positions shown as red strips in the diagram labeled "front." They should be sewn right over the seam binding. Once the staples are removed and the project folded together, the "smooth" and "sticky" pieces of Velcro should line up and fold together without much effort.

STEP 6 Fold the ends of the rainbow strap under to prevent fraying and sew the sides of the strap to the location shown as blue strips in the diagram called "front." If you want the strap to be adjustable, cut the strap 5 inches from the pouch and sew a ring there. Put the freshly cut end through another ring, then run it through the ring you just sewed to the strap. Run the freshly cut end back through the second ring and sew it so that the second ring acts as a slipknot. You may find, depending on the size of your strap vs. the size of your rings, that the second ring needs to be smaller than the first.

STEP 7 Now that your pouch is finished, here are some tips on how to use it. We found that we could fit up to 14 disks safely in our pouch, without a problem. In fact, an entire box will fit if only the upper rainbow elastic is used. The Velcro allows one to tighten the pouch as tight as one needs to safely carry one or several disks. 



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IBM PCjr Grows Up...

... WITH A NEW KEYBOARD, MORE MEMORY,
AND A FLOOD OF SOFTWARE

BY CHARLES H. GAJEWAY

All indications are that new computer buyers are willing to pay more money for more powerful machines. Last fall and Christmas, sales of the Apple IIc and IBM PCjr, selling for about \$1,000, soared to new heights, while sales of the Atari 800XL and Commodore 64, selling for well under \$200, slumped. One reason for this sales trend is that more and more people are expecting to get some kind of serious use from their computer—whether it be work they've taken home from the office, a business run from the home, or personal money management.

This, of course, is not particularly surprising—merely part of the computer industry evolution that started with video games. What is surprising is the comeback of the IBM PCjr, a computer that was on the mat for a nine-count.

When we first looked at the IBM PCjr a little over a year ago (April 1984), it was something of a disappointment. Touted by IBM as a home-priced and home-designed machine that would run office software, the original jr was a misfit offspring of the capable—and more expensive—IBM PC. The jr was solidly made, but it had a maximum of one disk drive, an original limit of 128K RAM, and an absolutely awful Chiclet-style keyboard ill-suited to adult hands.

With little software of its own, and unable to run such popular business programs as *Lotus 1-2-3* and *Multimate*, the PCjr was no bargain at its original price of \$1,269 (without a monitor). Buyers stayed away in droves. As Yogi Berra used to say: "If the people don't want to come out to the [ball]park, nobody's gonna stop 'em."

But IBM and a handful of third-party manufacturers set out to correct the jr's shortcomings. IBM abandoned the ill-fated Chiclet keyboard, and even gave new typewriter-style keyboards to all existing jr owners. Memory expanders, parallel-printer



ports, disk drives, a speech synthesizer with a microphone jack, and a relatively low-priced RGB color monitor began to appear. The jr still didn't sell. And then, before Christmas 1984, IBM dealers began selling the 128K jr, complete with a disk drive and the PCjr Color Display (an RGB monitor), for well under \$900. Sales picked up dramatically.

No wonder. The PCjr reincarnated is a fine computer for the home. In the under-\$1,000 price category, it's the fastest on the market (with a 16-bit microprocessor) and its disk drive stores the most (360K). Plus, it has good color display (with RGB capability), adequate sound (three voices), and a pile of impressive software (see list), some of which is exclusive to IBM (and compatible) micros. *Managing Your Money*, for instance, one of the more fluent and powerful pieces of software on the market, runs only on the IBM line. And *Lotus 1-2-3*, which doesn't run on any other microcomputer for under \$1,000, now runs on the PCjr.

On Jan. 31, IBM dropped the Christmas price promotion, making it once again a tough buying decision for a home user. But, as a business computer, the PCjr is still far and away the leader in its price range.

PCjr WITH PINSTripES

I've been using an expanded PCjr (with 512K and one disk drive) in my office for more than six months now, and it has proved a capable performer, if somewhat slower and less convenient than a two-drive IBM PC.

With this system (about \$2,000) I routinely use the disk version of *Lotus 1-2-3*, the *Wordvision* word-processing program, *pfs: File*, and a number of handy IBM PC utility programs. My expanded PCjr system fits handily on my desk, works smoothly, and is compact enough to tote home if the need arises.

There are some drawbacks, of course. Making backup copies of disks is tedious with the single drive. When I work with large files, the slower speed of the jr becomes apparent. Some IBM PC software doesn't work properly, because of slight differences between the PC and PCjr internal operating systems and/or video displays. Other programs designed for the PC, such as *Microsoft Word*, are not recommended even for a 256K PCjr because they require too much disk swapping.

HOW TO EXPAND jr

Building a professional system around the PCjr requires some difficult choices. The new IBM PCjr keyboard, for example, is a big improvement—the keys are large and well-shaped, and their operation is smooth and satisfying. But it doesn't duplicate all the IBM PC function and cursor control keys, even though you can achieve the same effects with different key combinations. So, if you're used to a certain program on the PC, you might have to learn some new keystroke combinations to run a program on the PCjr. The Key Tronic KB 5150 jr keyboard duplicates the IBM PC keys, but is much larger than the jr unit, doesn't have very good tactile feedback, and costs more than \$200.

You face another decision-making crossroad when expanding the jr's memory. The IBM memory expansion unit—\$325 for 128K—is definitely not the product of choice. The Tecmar jrCaptain (\$395) and the AST jrCombo (\$395) offer a clock and a parallel printer port in addition to an extra 128K. They come with useful software, including a RAM-disk program (which utilizes RAM as if it were a disk drive—in effect adding a

Contributing editor CHARLES GAJEWAY wrote the original review of the IBM PCjr in the April 1984 issue.

second drive) and a print spooler. Both units can accommodate up to 512K (an additional \$400 for AST; \$600 for Tecmar), bringing your jr's total RAM to a hefty 640K!

A second drive is a necessity for many business programs. Quadram's Quadjr Expansion Chassis (\$695) and Racore's Drive Two Enhancement Package (\$675) both sit double-decker atop the jr and allow expansion to 512K of memory as well as

that sorely missed second drive; the Quadjr also includes a clock and a parallel port. Second drives are also sold by Falcon Technology (\$745) and Xetec (\$399). However, the conservative user might want to use an electronic RAM drive instead of a second disk drive. This approach saves money and offers greater speed.

The question is, Why go through all the trouble and expense of expanding a PCjr when you could just get a PC in

the first place? Two reasons. A full-blown PCjr (with 640K and two disk drives) costs \$500 to \$1,000 less than a comparable PC. Plus, the PCjr has better sound and color than the PC, so there's better educational and entertainment software available for it. The jr also has a more powerful BASIC (cartridge). IBM has finally fulfilled its promise of a home-priced machine that can run professional software. **FC**

PCjr SOFTWARE SAMPLER

Here's a sampling of the best programs out for the jr. Our reviewers have tested them for other computers, and we've tried the jr versions to make sure they're comparable, or better. Note: Some packages may require Cartridge BASIC.

WRITING:

Bank Street Writer (128K); Broderbund Software (415) 479-1170; \$79. This package has already introduced over 250,000 people to writing on a computer. It's been streamlined and enhanced for the jr. HELP screens, a clear manual, and menu-driven format make it a great first word processor.

Creative Writer (128K); Creative Software (408) 745-1655; \$79. Take care of mass-mailings and form letters with package capable of using reports and data from Creative's file program and spreadsheet (see *spreadsheet article*).

FINANCE MANAGEMENT:

Certified Personal Accountant (128K); Progressive Peripherals and Software (303) 759-5713; \$149. This finance-management program handles hundreds of different kinds of accounts, including stocks and tax categories.

Managing Your Money (128K); IBM (305) 241-7623; (256K); MECA (203) 222-1000; \$199. This finance-management program by Andrew Tobias is like an interactive version of his classic best-selling book, *The Only Investment Guide You'll Ever Need*.

Your Personal Net Worth (128K); Scarborough Systems (914) 332-4545; \$99. In addition to budgeting, and keeping track of 350 accounts and a stock portfolio, *Net Worth* will help you analyze different loans and financing. Easy to use, with plenty of on-screen help, and a valuable glossary.



PCjr ColorPaint

PRODUCTIVITY:

Lotus 1-2-3 (128K); Lotus Development Corp. (617) 494-1192; \$495. Hefty program lets you play "What if" with just about any kind of numerical data. Lotus' extensive graphing and filing capabilities make it more than a spreadsheet, but this classic program's many features probably make it overkill for most homes.

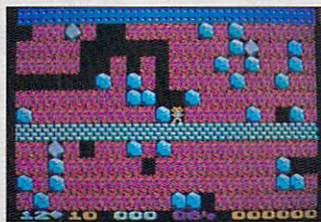
pfs: File (128K); Software Publishing (415) 962-8910; \$140. Easy to set up, and easy to get results from, this well-documented file system (data base) can be used in conjunction with companions *pfs: Write* and *pfs: Report*. Suitable for billing and simple accounting.

EDUCATION/FUN LEARNING:

Agent U.S.A. (64K); Scholastic Software (212) 505-3567; \$39. On the trail of the "Fuzz-bomb," you track down the source of an epidemic threatening the nation. You can't help but learn some geography in this entertaining challenge.

Bumble Plot (128K); IBM (305) 241-7623; \$39. A creature named Bumble from the planet Furrin helps your kids, ages 8-13, learn mapping, graphing, and integers.

Early Games For Young Children (64K); Springboard Software (800) 328-1223; \$34. Letter and number recognition, simple counting, learning to distinguish shapes: preschoolers have quite a selection of activities with this colorful, easy program.



Boulder Dash

MasterType (64K); Scarborough Systems (914) 332-4545; \$39. **Typing Tutor III** (64K); Simon & Schuster (212) 245-6400; \$49. It's a toss-up between these two typing programs. The former takes the arcade approach: Improve your typing as you blast attacking semicolons, letters, asterisks, and full words out of the air. The latter takes a more serious approach—with exercises that adjust to your progress.

Math Blaster (96K); Davidson & Associates (213) 373-0971; \$49. Addition, subtraction, multiplication, division, fraction, and decimal problems at a variety of levels challenge you in this straightforward math package with a fun arcade drill game.

Micro SpeedRead (128K); CBS Software (203) 622-2500; \$125. Learn to read more quickly and with better comprehension with this complete tutorial.

Spellagraph (64K); DesignWare (800) 572-7767; \$39. Add your own or use prepared word lists organized according to spelling rules. Fill in the blank and uncover pieces of a puzzle to solve a rebus.

ART:

PC Paint (256K); Mouse Systems (408) 988-0211; \$195. (Mouse/software combination). Modelled after the Macintosh's popular *MacPaint* program, *PC Paint* lets you select from a variety of colors, brushes, and more. Also try **PCjr ColorPaint** (128K, cartridge); IBM (305) 241-7623; \$99. A many-

featured package with pull-down menus. Mouse required.

KoalaPad with MicroPainter. Koala Technologies (408) 986-8866; \$125. This popular touch tablet and graphics package is good for creating color pictures as well as business graphics.

GAMES:

Boulder Dash (64K); First Star Software (212) 532-4666; \$40. Guide the insatiable Rockford through 16 caves at 5 levels of difficulty as he seeks gems, and dodges plummeting boulders and enemy amoebas.

Flight Simulator (64K); Microsoft (206) 828-8080; \$49. A tough but riveting and realistic simulation of small aircraft flight includes great graphics and a fighter-pilot sequence for shoot-'em-up fans.

King's Quest (128K); IBM/Sierra (305) 241-7623; \$49. Wander through an animated world in search of treasures that will make you the next king. Combination of typed commands and joystick control make a unique adventure experience.

Lode Runner (128K); Broderbund Software (415) 479-1170; \$79. Climb, jump, dodge, dig, run, and otherwise outwit pursuers. Try to manage to make it through the 150 screens, or invent new scenarios with the game generator.

One-on-One (128K); Electronic Arts (415) 571-7171; \$40. You don't have to love basketball to enjoy this face-off between Larry Bird and Dr. J. One of the most naturalistic and colorful sports games around.

Wizardry (64K); Sir-tech (315) 393-6633; \$59. Compose a band of voyagers of different strengths, and set forth into an unexplored dungeon—encountering demons and wraiths—as you search for a magic ring in this adventure.

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the Programmer

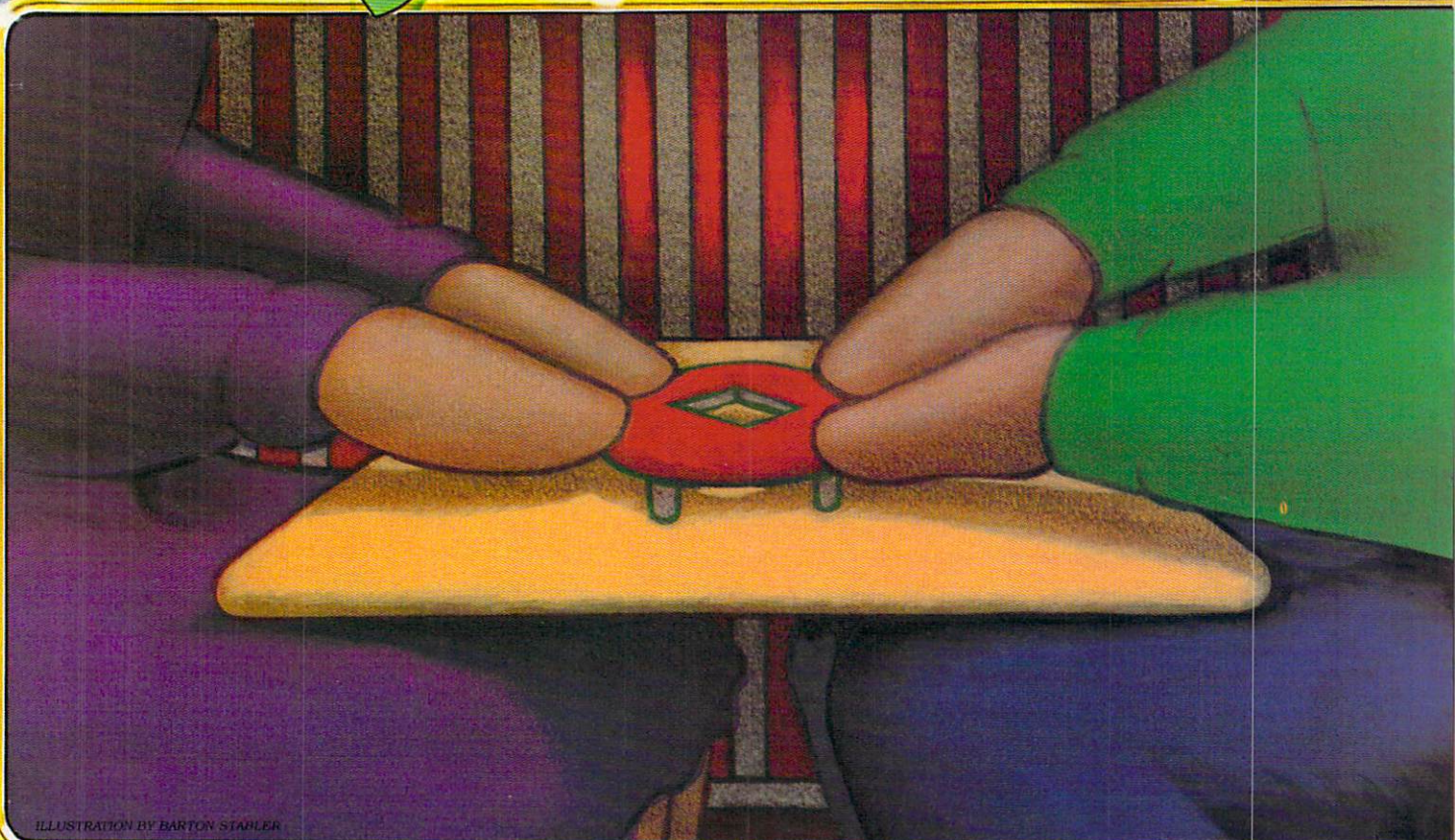


ILLUSTRATION BY BARTON STABLER



M A Y



TIPS TO THE TYPIST

Page 46

Helpful hints
on how to type
in our programs,
and
what to do
if a program
doesn't work.

BEGINNER PROGRAM

Page 50

!gnitseretni
erom dnuos
dna kool
sdrow ekam dna
Backward Speller
htiw CISAB
emos nrael

PRODUCTIVITY PROGRAM

Page 52

Numbers
got you down?
With *Bar Graph*,
seeing
the big picture
is a snap.

PUZZLE

Page 59

The medium
is your computer—
the message
seems magical!
Identify
the impostor,
or question
the computer on
any subject!

PROGRAMMING P.S. Page 64 Notes about previous months' programs.

ILLUSTRATION BY JIM CHERRY III

Cherry

TIPS TO THE TYPIST

HOW TO TYPE IN FAMILY COMPUTING'S PROGRAMS



Typing in FAMILY COMPUTING's programs is a great way to become familiar with your computer and get some free software "to boot." But it's frustrating to type in a long program only to find it doesn't work as it should. When this happens, simple typing errors are most often the cause. So, to help you gain greatest value from the time you spend computing with us, we've put together some tips on how to avoid typing errors—and what to do if a program doesn't run right. Read them carefully and you'll be up and running in no time!

SOME GENERAL RULES

- 1. Do** set up your computer in a well-lighted, comfortable location, and prop the magazine up so that you don't have to strain to read the printed listing.
- 2. Do** read instructions and program headings carefully. Make sure your computer has enough memory, the right version of BASIC, and the appropriate peripherals (joysticks, printers, disk drives, etc.) for a program.
- 3. Don't** let fatigue and boredom contribute to inaccuracy. If you're new to programming, try typing in shorter programs first. Type in a longer program in easy stages, **SAVE**ing each installment as you go.
- 4.** Until you are fairly familiar with BASIC, **do** assume that every word, number, letter, space, and punctuation mark in a program listing must be copied accurately if the program is to function as intended.
- 5. Do** watch out for potential trouble spots. About 90 percent of all typing errors occur in DATA statements: long lines filled with numbers or incomprehensible secret codes. If possible, have someone else read DATA to you as you type, and help you proofread it if you have trouble later on. Proofreading from a printout is best.
- 6. Do** be aware that program listings printed in FAMILY COMPUTING sometimes differ from what you will see on your computer's screen or in printouts you produce at home. Our program listings are printed 54 characters wide. Thus, a single BASIC program "line" (sometimes called a "logical line") may appear as several lines in our listing. If you are typing along and reach the right margin of the printed listing, don't press RETURN or ENTER until you've checked to see if the program "line" you're typing really ends there. The way to tell is to check if the line following begins with a multiple of 10 that follows in sequence from the previous logical line. REM statements are the exception and typing them in is optional.

Several computers (ADAM, Apple, Atari, and TI) format BASIC programs according to unique rules of their own. Don't let this throw you—just type in the listing exactly as printed in the magazine and your computer is guaranteed to accept it, even though it may end up looking a little different on your screen.

7. One foolproof way to correct an error in a BASIC program line is to type the line in again from the beginning, and press RETURN or ENTER to make it replace the old line in your computer's memory. But this laborious approach is not the only way to handle typos. **Do** learn to use your computer's editing commands and function keys to correct errors as you go along.

8. Do try to understand your computer's error messages and what they signify. Some provide very detailed information on what may be wrong with a particular program line; others just provide cryptic codes that you have to look up in the manual; and some give you codes that can be positively misleading. More on this in "Debugging Hints," below.

TYPING TIPS FOR SPECIFIC MACHINES

ADAM

- FAMILY COMPUTING's programs are written in Revision 79 SmartBASIC, and are not guaranteed to run under earlier SmartBASICs that contained bugs. To determine if you have Revision 79, boot your SmartBASIC Data Pack, enter PRINT PEEK(260), and press RETURN. If the computer prints out a number lower than 79, contact Coleco Customer Service at (800) 842-1225 and request the latest revision.

- Our ADAM listings are copies of ADAM printouts, and contain both uppercase and lowercase. If you like, you can type in the greater portion of any program in lowercase to speed typing. But be careful: You *must* enter text between quotation marks (for example, in PRINT statements) and the contents of DATA statements exactly as printed—in uppercase and lowercase.

Apple

- Unless otherwise specified, FAMILY COMPUTING's Apple programs will run under Applesoft (*not* Integer) BASIC on the Apple II (with language card), II plus, IIe, and IIfx.
- Fixing mistakes in an Apple program line isn't easy. If you're going to be doing much programming, we recommend you look at a utility called GPLE (Global Program Line Editor), \$50, from Beagle Brothers Software, 3990 Old Town Ave., Suite 102C, San Diego, CA 92110; (619) 296-6400. GPLE will give your Apple sophisticated and easy-to-use editing capabilities.

Atari

- Our Atari programs are designed to run under Atari BASIC on Atari 400, 600XL, 800, and 800XL machines, except as otherwise specified.
- Owners of Atari 400 and 800 machines should be aware that their machines lock up sometimes during long typing sessions. **SAVE** your program often as you're working on it.

The END of DINKETY-DINK-DINK.

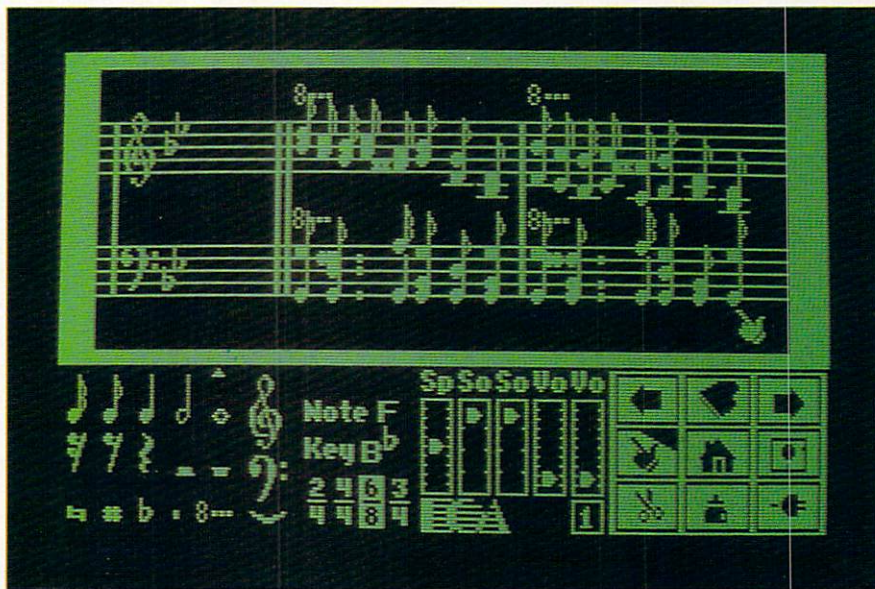
Announcing the first computer music program that actually sounds like music.

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Take a good look at this screen because it, you, and a joystick are the whole story here.

That's you at the right end of the staff of notes — the little hand. Move the joystick, and you move the hand. Use it to carry notes up to the staff. Lay in rests, signatures, clefs, then point



to the little piano in the lower right and listen, because you'll hear the whole thing played back.

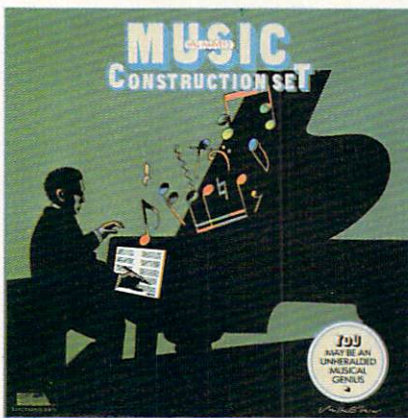
Move those little scales in the middle up and down to vary the music's speed, sound quality, and volume. Use

the scissors to cut out whole measures, then use the glue pot to paste them in somewhere else. Got a printer? Great. Print the score out and show it off to your friends.

But what if you're not up to writing your own stuff yet? No problem. There are twelve pieces of music already in here, from rock 'n roll to baroque. They're fun to listen to, and even more fun to change. (Apologies to Mozart.)

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Commodore 64 and VIC-20

- Commodore 64 and VIC-20 editing can seem very confusing if you're not accustomed to it. Read your manual and learn all about "quote mode," etc. You'll be glad you did.
- Many readers are confused by a caret (^) character that doesn't appear on their keyboard but sometimes shows up in Commodore 64 and VIC-20 listings. This is the exponentiation operator ($2^2 = 2$ squared, or 4). It's entered by pressing the up-arrow (↑) key—not the up-cursor key—and appears as an up-arrow on the screen, but not in listings produced on a standard printer.
- Sometimes invisible characters sneak into a program line on Commodore computers. They can cause seemingly inexplicable problems to occur. The cure may be as simple as typing the line in again from the beginning.

IBM PC and PCjr

- Our IBM programs will run under built-in Cassette BASIC on the PC and PCjr, unless otherwise specified. PC owners may occasionally require a Color Graphics Adapter, or Disk or Advanced BASIC; and PCjr owners occasionally need Cartridge BASIC to run our programs. The program heading will say if this is so. Separate listings are occasionally provided for PC and PCjr where incompatibilities exist.
- The IBM PCs have a quirk you should be aware of. If you finish entering one program line very close to the right margin of the screen and then press ENTER and type in another, the two lines may get linked together invisibly. This can also happen when you're fixing typos in a block of program lines you've LISTED on the screen. When you RUN a program that contains a linked pair of lines, you'll probably get a SYNTAX ERROR—but when you LIST the lines on the screen, they'll look perfectly normal. If you've got an otherwise inexplicable problem, check for this phenomenon by LISTING the offending line, and its neighbors.

TI-99/4A

- Most of our TI programs are written in standard TI BASIC, so don't use Extended BASIC unless told to do so.
- Lowercase letters appear a little shorter than uppercase letters on the TI screen, but the two are otherwise almost identical. Not so for uppercase and lowercase letters in our TI listings. Where lowercase is required in a TI program, it will appear as *standard* lowercase in our printed listings (abcd as opposed to ABCD).

TRS-80 Color Computer

- Except where otherwise specified, our programs will run under Standard, Extended, or Disk Extended Color BASIC.

TRS-80 Models III and 4

- Our TRS-80 Model III programs will run under either Cassette or Disk BASIC, except where otherwise specified. They'll also run on Model 4s and 4Ps in Model III mode (under Model III BASIC). Most programs will also run on Model Is, but this isn't guaranteed.

Special note to owners of Kaypro and other CP/M machines: Some of our Model III text-only programs can easi-

ly be made to run on CP/M machines under Microsoft BASIC-80. If you want to try your hand at translations, see Helpful Hints, page 50, in the April FAMILY COMPUTING.

DEBUGGING HINTS

Sometimes even the most careful typist makes a mistake. Don't expect your program to run right off the bat. If you have problems, remain patient and follow these general instructions for a probable quick fix.


1. Write down any error messages you receive.
2. If necessary, look these up in your manual, and check the indicated lines for simple mistakes. Also check related lines (see No. 4, below), such as the DATA statements corresponding to a READ routine. Correct all the problems you can find, and SAVE a corrected copy of the program before typing RUN again. If you're lucky, all systems will be GO; if not . . .
3. LIST the program in screen-size chunks (check your manual for instructions on how to LIST parts of a program). Even better, if you have a printer, get a printout. Compare what you've typed in—letter by letter—to the published program. Make sure that you haven't typed the numeral 0 (which is slashed in our listings) for the letter O (which isn't), swapped a small letter "l" for the numeral one, dropped or mixed up some punctuation, switched uppercase text for lowercase or vice versa (particularly in DATA statements or within quotes), or miscounted the characters (and/or spaces) between a pair of quotes. Get someone to help you if possible.
4. Check your DATA statements—then check them again. Mistakes in DATA statements are the single most common cause of program failures. Bad DATA can cause a program to malfunction at any point, which can be misleading. If you can't find your error in the lines the computer specifies, check your DATA statements line by line, letter by letter, comma by comma. Then have someone else do it. If necessary, try again the next day—exhausted proofreaders are careless proofreaders. And finally . . .

WHAT TO DO WHEN YOU'VE DONE IT ALL

We test our programs carefully, both before and after publication. Typographical mistakes are rare—but sometimes we *do* find errors. When we do, we publish corrections—usually within one or two issues.

We're proud of our programs, and we want you to enjoy them as much as we enjoy writing them. If you just can't figure out what's wrong with a program, we'd like to help. But we can't if you don't provide us with important information. When you write us, please indicate:

- Which program you're having trouble with.
- Which type of computer you own, the type of BASIC you are using, how much RAM your computer has, and what DOS and peripherals you're using, if any.
- What error messages your computer has given you.
- Your name, address, and telephone number.

If possible, please enclose a printout. Send a stamped, self-addressed envelope for faster replies. Address all correspondence to Programming P.S., FAMILY COMPUTING, 730 Broadway, New York, NY 10003. 



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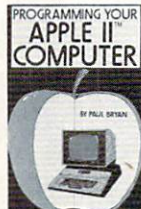
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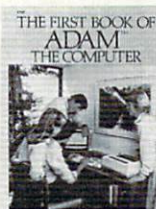
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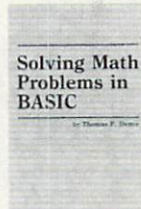
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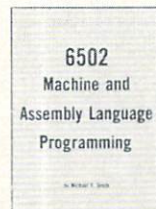
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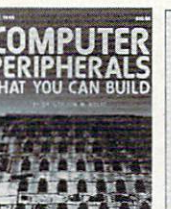
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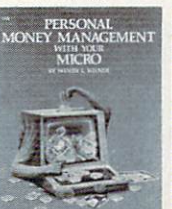
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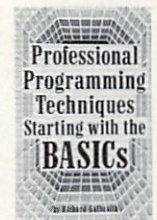
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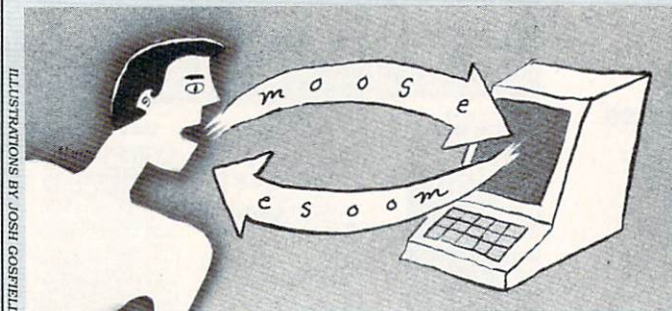


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BACKWARD SPELLER

BY JOEY LATIMER



Are you tired of calling your friends, family, and pets by their normal, everyday names? With *Backward Speller*, you type the name FRED and the computer displays DERF; Spot, your dog, becomes TOPS; and monkey Bonzo forever becomes OZNOB! As you can see, some words sound more interesting spelled backward.

When you run the program, the computer asks you to type in a word. An INPUT statement puts your word in a variable, ws. (The dollar sign means that the variable ws is a string variable—a place where you can store text.) The letters in ws are then pulled out, one by one, last to first, and printed on the screen.

In all versions of the program but the Atari, which uses subscripts to refer to portions of a string, the function MIDS (or its equivalent, SEGS, in the TI ver-

sion) is used to pull individual characters from ws for printing. This operation is repeated by a FOR-NEXT loop that uses the LEN function to figure out how many letters ws has, and counts from that number (the last letter of your word) down to 1 (the first letter, naturally!). The expression STEP -1 tells the FOR-NEXT loop to count backward.

I chose to keep *Backward Speller* simple, but those of you with color computers might try coloring the letters. Can you make only the backward word a different color?

If you come up with an interesting "custom" version of one of our beginner programs, we might mention it in a future issue. Send a printout (no tapes or disks, please), with explanation, to Beginner Programs, FAMILY COMPUTING, 730 Broadway, New York, NY 10003.

ADAM/Backward Speller

```
10 HOME
20 PRINT "Type a word;"
30 PRINT "then press <RETURN>."
40 PRINT
50 INPUT "What is the word? ";ws
60 PRINT
70 PRINT "Spelled backward it's"
80 FOR x = LEN(ws) TO 1 STEP -1
90 PRINT MIDS(ws,x,1);
100 NEXT x
110 PRINT "!"
120 PRINT
130 PRINT "Press <P> to play again"
140 PRINT "or any other key to quit."
150 GET k$
160 IF k$ = "P" OR k$ = "p" THEN 10
170 END
```

Apple/Backward Speller

```
10 HOME
20 PRINT "TYPE A WORD; THEN PRESS <RETURN>."
30 PRINT
```

```
40 INPUT "WHAT IS THE WORD? ";ws
50 PRINT
60 PRINT "SPELLED BACKWARD IT'S ";
70 FOR X = LEN(ws) TO 1 STEP -1
80 PRINT MIDS(ws,X,1);
90 NEXT X
100 PRINT "!"
110 PRINT
120 PRINT "PRESS <P> TO PLAY AGAIN"
130 PRINT "OR ANY OTHER KEY TO QUIT.";
140 GET K$
150 IF K$ = "P" THEN 10
160 END
```

Atari/Backward Speller

```
10 DIM WS(100)
20 OPEN #1,4,0,"K:"
30 PRINT CHR$(125);
40 PRINT "TYPE A WORD; THEN PRESS <RETURN>."
50 PRINT
60 PRINT "WHAT IS THE WORD";
70 INPUT WS
80 PRINT
90 PRINT "SPELLED BACKWARD IT'S ";
100 FOR X=LEN(WS) TO 1 STEP -1
110 PRINT WS(X,X);
120 NEXT X
130 PRINT "!"
140 PRINT
150 PRINT "PRESS <P> TO PLAY AGAIN"
160 PRINT "OR ANY OTHER KEY TO QUIT.";
170 GET #1,K
180 IF K=ASC("P") THEN 30
190 END
```

Commodore 64/Backward Speller

```
10 PRINT CHR$(147);
20 PRINT "TYPE A WORD; THEN PRESS <RETURN>."
30 PRINT
40 INPUT "WHAT IS THE WORD";ws
50 PRINT
60 PRINT "SPELLED BACKWARD IT'S ";
70 FOR X=LEN(WS) TO 1 STEP -1
80 PRINT MIDS(WS,X,1);
90 NEXT X
100 PRINT "!"
110 PRINT
120 PRINT "PRESS <P> TO PLAY AGAIN"
130 PRINT "OR ANY OTHER KEY TO QUIT."
140 GET K$
150 IF K$="" THEN 140
160 IF K$="P" THEN 10
170 END
```

IBM PC & TRS-80 Model III/Backward Speller

```
10 CLS
20 PRINT "TYPE A WORD; THEN PRESS <ENTER>."
30 PRINT
40 INPUT "WHAT IS THE WORD";ws
50 PRINT
60 PRINT "SPELLED BACKWARD IT'S ";
70 FOR X=LEN(WS) TO 1 STEP -1
80 PRINT MIDS(WS,X,1);
90 NEXT X
100 PRINT "!"
110 PRINT
120 PRINT "PRESS <P> TO PLAY AGAIN OR ANY OTHER KEY TO QUIT."
130 K$=INKEY$
140 IF K$="" THEN 130
150 IF K$="P" OR K$="p" THEN 10
160 END
```

IBM PCjr/Backward Speller

```
10 CLS
20 PRINT "TYPE A WORD; THEN PRESS <ENTER>."
30 PRINT
40 INPUT "WHAT IS THE WORD";ws
```


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```

50 PRINT
60 PRINT "SPELLED BACKWARD IT'S ";
70 FOR X=LEN(WS) TO 1 STEP -1
80 PRINT MID$(WS,X,1);
90 NEXT X
100 PRINT "!"
110 PRINT
120 PRINT "PRESS <P> TO PLAY AGAIN"
130 PRINT "OR ANY OTHER KEY TO QUIT."
140 K$=INKEY$
150 IF K$="" THEN 140
160 IF K$="P" OR K$="p" THEN 10
170 END

```

TI-99/4A/Backward Speller

```

10 CALL CLEAR
20 PRINT "TYPE A WORD;"
30 PRINT "THEN PRESS <ENTER>."
40 PRINT
50 INPUT "WHAT IS THE WORD? ";WS
60 PRINT
70 PRINT "SPELLED BACKWARD IT'S"
80 FOR X=LEN(WS) TO 1 STEP -1
90 PRINT SEG$(WS,X,1);
100 NEXT X
110 PRINT "!"
120 PRINT
130 PRINT "PRESS <P> TO PLAY AGAIN"
140 PRINT "OR ANY OTHER KEY TO QUIT.";
150 CALL KEY(3,K,S)
160 IF S=0 THEN 150
170 IF K=ASC("P") THEN 10
180 END

```

TRS-80 Color Computer/Backward Speller

```

10 CLS
20 PRINT "TYPE A WORD; THEN PRESS <ENTER>.";
30 PRINT
40 INPUT "WHAT IS THE WORD";WS
50 PRINT
60 PRINT "SPELLED BACKWARD IT'S"
70 FOR X=LEN(WS) TO 1 STEP -1
80 PRINT MID$(WS,X,1);
90 NEXT X
100 PRINT "!"
110 PRINT
120 PRINT "PRESS <P> TO PLAY AGAIN"
130 PRINT "OR ANY OTHER KEY TO QUIT."
140 K$=INKEY$
150 IF K$="" THEN 140
160 IF K$="P" THEN 10
170 END

```

VIC-20/Backward Speller

```

10 PRINT CHR$(147);
20 PRINT "TYPE A WORD;"
30 PRINT "THEN PRESS <RETURN>."
40 PRINT
50 PRINT "WHAT IS THE"
60 PRINT "WORD";
70 INPUT WS
80 PRINT
90 PRINT "SPELLED BACKWARD IT'S"
100 FOR X=LEN(WS) TO 1 STEP -1
110 PRINT MID$(WS,X,1);
120 NEXT X
130 PRINT "!"
140 PRINT
150 PRINT "PRESS <P> TO PLAY"
160 PRINT "AGAIN OR ANY OTHER"
170 PRINT "KEY TO QUIT."
180 GET K$
190 IF K$="" THEN 180
200 IF K$="P" THEN 10
210 END

```

BAR GRAPH

BY JOHN JAINSCHIGG

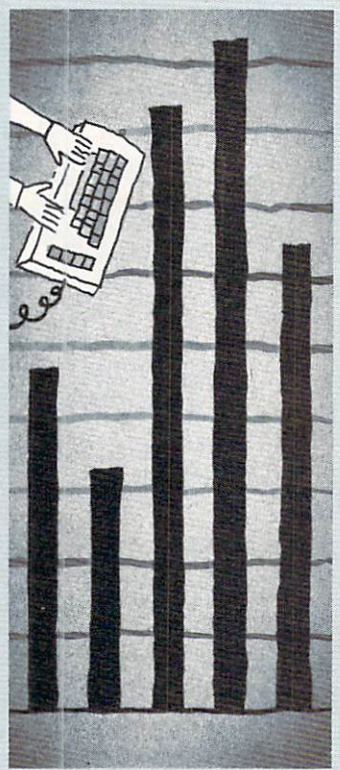
Almost nothing's as useful as a graph when you're trying to compare data or spot a trend. *Bar Graph* makes it easy to use your computer to graph small amounts of data: bills, stock prices, heights or weights, or even the way your moods shift from day to day!

When you RUN the program, you will be asked to enter a name and a value for each item you want to graph. For example, if you're graphing your 1984 phone bills, you might enter JANUARY, JAN, or 1/84 as the name of your first item. If your January bill was for \$95.75, you would enter 95.75 as this item's value. Note that dollar signs, unit symbols (e.g., lbs., oz.), etc. must be omitted when entering values. Note also that *Bar Graph* will not accept values less than zero.

When you're finished entering items, just press RETURN or ENTER when asked for the name of the next item. The program will ask you to supply a title for the graph; then it will draw the graph on the screen, using the name you've supplied for each item to label the corresponding bar. The program will print only as much of a label as will fit on the screen . . . don't be surprised if WEDNESDAY comes out as WEDN.

PROGRAM NOTES

Bar Graph is a simple program that graphs a body of data by scaling its values to fit in the limited space of your computer's screen. A general-purpose graphing program should be able to handle values of any size. For this reason, it can't simply draw a five-block bar to represent the value 5; a 10-block bar for 10, and so on, as this would restrict the program to handling only numbers in a very limited range.



The answer to this problem is *scaling*: converting a group of values to numbers that will fit nicely on the screen while maintaining their proportions to one another. *Bar Graph* does this by finding the largest value in a group of items and determining what fraction of this value each other value represents. It then multiplies this fraction by the maximum number of graphic units that can be displayed to determine the number of units in that value's bar. For example, if the largest value you input is 5 and your screen has room for a bar 20 units high, the value 5 will be drawn as a 20-unit bar, and the value 3 as a bar $3/5$ as high, or $3/5 \times 20 = 12$ units high.

It might be interesting to modify *Bar Graph* to work with a printer, or add routines to save a group of values to tape or disk for later retrieval. Or you could try redesigning the program to work in graphic modes of higher resolution, improving its ability to depict small differences between values over a broader range.



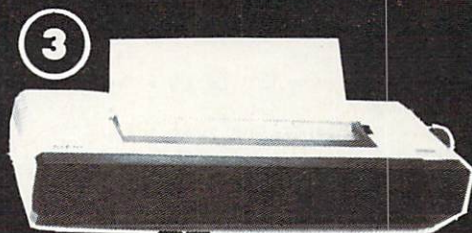
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PRODUCTIVITY PROGRAM

ADAM/Bar Graph

```

10 DIM a(29),l$(29)
20 FOR j = 1 TO 30:b$ = b$+" ":NEXT j
30 m = 0:i = 1
39 REM --GET NAME OF ITEM--
40 GOSUB 1000:IF i <> 16 THEN 80
50 VTAB 3:PRINT "Warning! If you add more items"
60 PRINT "there will be no space between"
70 PRINT TAB(5);"the bars in your graph."
80 VTAB 7:PRINT "Please enter the name of"
90 PRINT "item #";i;"."
100 IF i = 1 THEN 130
110 PRINT "(Just press <RETURN> if"
120 PRINT "you have no more items.)"
130 PRINT:INPUT "":l$(i)
140 IF l$(i) <> "" THEN 200
150 IF i = 1 THEN 40
160 VTAB 12:PRINT "Are you finished entering"
170 PRINT "items?"
180 GET k$:IF k$ = "Y" OR k$ = "y" THEN 250
190 GOTO 40
199 REM --GET VALUE FOR THAT ITEM--
200 GOSUB 1000:VTAB 7:PRINT "What is the value for"
210 PRINT "item #";i;" (";l$(i);")";
220 INPUT a(i):IF a(i) < 0 THEN 200
230 IF m < a(i) THEN m = a(i)
240 i = i+1:IF i < 30 THEN 40
250 i = i-1:IF m = 0 THEN m = 1
260 HOME:PRINT "What is the title of your"
270 PRINT "graph?"
280 PRINT:INPUT "":t$:IF t$ = "" THEN 260
290 IF LEN(t$) > 30 THEN t$ = LEFT$(t$,30)
300 c = INT(16-(INT(30/i)*i)/2)+1
309 REM --DRAW GRAPH--
310 HOME:PRINT TAB(c-1);m
320 FOR j = 1 TO 18:PRINT TAB(c-1);CHR$(124):NEXT j
330 PRINT TAB(c-1);"0"
340 lw = INT(30/i)-(i < 16)
350 FOR j = 1 TO i:VTAB 21:HTAB c
360 IF LEN(l$(j)) >= lw THEN PRINT LEFT$(l$(j),lw):G
OTO 380
370 PRINT l$(j)
380 ch = INT(a(j)/m*18+.5):IF ch < 1 THEN 430
390 FOR k = 1 TO ch
400 VTAB 20-k:HTAB c
410 INVERSE:PRINT LEFT$(b$,lw):NORMAL
420 NEXT k
430 c = c+INT(30/i):NEXT j
440 VTAB 22:PRINT TAB(16-LEN(t$)/2);
450 INVERSE:PRINT t$:NORMAL:PRINT
460 PRINT " (Press any key to continue.)";
470 GET k$:HOME
480 PRINT "Press <D> to draw another"
490 PRINT "graph or <Q> to quit."
500 GET k$:IF k$ = "Q" OR k$ = "q" THEN END
510 IF k$ = "D" OR k$ = "d" THEN 30
520 GOTO 500
999 REM --SET UP SCREEN FOR INPUT--
1000 HOME:PRINT TAB(11);"*BAR GRAPH*"
1010 VTAB 22:HTAB 5:INVERSE
1020 PRINT "You have room left for":NORMAL
1030 PRINT TAB(10);FLASH:PRINT 30-i;
1040 INVERSE:PRINT " item(s)."
```

Apple/Bar Graph

```

10 DIM A(37),L$(37)
20 FOR J = 1 TO 38:B$ = B$+" ":NEXT J
30 M = 0:I = 1
39 REM --GET NAME OF ITEM--
40 GOSUB 1000:IF I <> 20 THEN 80
```

```

50 VTAB 3:PRINT CHR$(7);"WARNING! IF YOU ADD MORE ITEM
S, THERE"
60 PRINT TAB(8);"WILL BE NO SPACE BETWEEN THE"
70 PRINT TAB(12);"BARS IN YOUR GRAPH."
80 VTAB 7:PRINT "PLEASE ENTER THE NAME OF ITEM #";I;".
"
90 IF I = 1 THEN 120
100 PRINT "(JUST PRESS <RETURN> IF"
110 PRINT "YOU HAVE NO MORE ITEMS.)"
120 PRINT:INPUT "":L$(I)
130 IF L$(I) <> "" THEN 180
140 IF I = 1 THEN 40
150 VTAB 12:PRINT "ARE YOU FINISHED ENTERING ITEMS?";
160 GET K$:IF K$ = "Y" THEN 230
170 GOTO 40
179 REM --GET VALUE FOR THAT ITEM--
180 GOSUB 1000:VTAB 7:PRINT "WHAT IS THE VALUE FOR"
190 PRINT "ITEM #";I;" (";L$(I);")";
200 INPUT A(I):IF A(I) < 0 THEN 180
210 IF M < A(I) THEN M = A(I)
220 I = I+1:IF I < 38 THEN 40
230 I = I-1:IF M = 0 THEN M = 1
240 HOME:PRINT "WHAT IS THE TITLE OF YOUR GRAPH?"
250 PRINT:INPUT "":T$:IF T$ = "" THEN 240
260 IF LEN(T$) > 38 THEN T$ = LEFT$(T$,38)
270 C = INT(21-(INT(38/I)*I)/2)
279 REM --DRAW GRAPH--
280 HOME:PRINT TAB(C-1);M
290 FOR J = 1 TO 18:PRINT TAB(C-1);CHR$(124):NEXT J
300 PRINT TAB(C-1);"0"
310 LW = INT(38/I)-(I < 20)
320 FOR J = 1 TO I:VTAB 21:HTAB C
330 IF LEN(L$(J)) >= LW THEN PRINT LEFT$(L$(J),LW):GOT
O 350
340 PRINT L$(J)
350 CH = INT(A(J)/M*18+.5):IF CH < 1 THEN 400
360 FOR K = 1 TO CH
370 VTAB 20-K:HTAB C
380 INVERSE:PRINT LEFT$(B$,LW):NORMAL
390 NEXT K
400 C = C+INT(38/I):NEXT J
410 VTAB 22:PRINT TAB(20-LEN(T$)/2);
420 INVERSE:PRINT T$:NORMAL:PRINT
430 PRINT TAB(6);"(PRESS ANY KEY TO CONTINUE.)";
440 GET K$:HOME
450 PRINT "PRESS <D> TO DRAW ANOTHER GRAPH"
460 PRINT "OR <Q> TO QUIT.";
470 GET K$:IF K$ = "Q" THEN END
480 IF K$ = "D" THEN 30
490 GOTO 470
999 REM --SET UP SCREEN FOR INPUT--
1000 HOME:PRINT TAB(16);"*BAR GRAPH*"
1010 VTAB 22:HTAB 3:INVERSE
1020 PRINT "YOU HAVE ROOM LEFT FOR ";
1030 FLASH:PRINT 38-I;
1040 INVERSE:PRINT " ITEM(S)."
```

Atari/Bar Graph

```

10 DIM L$(760),R$(20),B$(38),T$(38),A(37)
19 REM --PREPARE FOR KEYBOARD INPUT--
20 OPEN #1,4,0,"K:"
29 REM --FILL L$ WITH BLANKS, B$ WITH SOLID BLOCKS--
30 B$=CHR$(160);B$(38)=B$:B$(2)=B$
40 L$="" :L$(760)=L$:L$(2)=L$
50 M=0:I=1
59 REM --GET NAME OF ITEM--
60 GOSUB 1000:IF I<>20 THEN 100
70 POSITION 1,5:PRINT CHR$(253);"WARNING! IF YOU ADD M
ORE ITEMS, THERE"
80 POSITION 5,6:PRINT "WILL BE NO SPACE BETWEEN THE"
90 POSITION 9,7:PRINT "BARS IN YOUR GRAPH."
```


PRODUCTIVITY PROGRAM

```

100 POSITION 2,9:PRINT "PLEASE ENTER THE NAME OF ITEM
#";I;". "
110 IF I=1 THEN 140
120 PRINT "(JUST PRESS <RETURN> IF"
130 PRINT "YOU HAVE NO MORE ITEMS.)"
139 REM --"TRAP" PROTECTS PROGRAM FROM BAD INPUT--
140 PRINT :TRAP 60:INPUT RS
150 TRAP 40000:IF RS<>" " THEN 200
160 IF I=1 THEN 60
170 POSITION 2,13:PRINT "ARE YOU FINISHED ENTERING ITE
MS?";
180 GET #1,KEY:IF KEY=ASC("Y") THEN 270
190 GOTO 60
199 REM --GET VALUE FOR THAT ITEM--
200 LS(I*20-19,I*20-1)=RS:GOSUB 1000
210 POSITION 2,7:PRINT "WHAT IS THE VALUE FOR"
220 PRINT "ITEM #";I;" (" ;RS;" )";
230 TRAP 200:INPUT A:TRAP 40000
240 A(I)=A:IF A(I)<0 THEN 200
250 IF M<A(I) THEN M=A(I)
260 I=I+1:IF I<38 THEN 60
270 I=I-1:IF M=0 THEN M=1
280 PRINT CHR$(125);
290 PRINT "WHAT IS THE TITLE OF YOUR GRAPH?":PRINT
300 TRAP 280:INPUT TS:TRAP 40000:IF TS="" THEN 280
309 REM --TURN OFF CURSOR WHILE DRAWING GRAPH--
310 POKE 752,1:C=INT(21-(INT(38/I)*I)/2)
319 REM --DRAW GRAPH--
320 PRINT CHR$(125);:POSITION C-1,0:PRINT M
330 FOR J=1 TO 18:POSITION C-1,J:PRINT CHR$(124):NEXT
J
340 POSITION C-1,19:PRINT "0"
350 LW=INT(38/I)-(I<20)
360 FOR J=1 TO I:POSITION C,20
370 IF LW<20 THEN PRINT LS(J*20-19,J*20-20+LW):GOTO 39
0
380 PRINT LS(J*20-19,J*20-1)
390 CH=INT(A(J)/M*18+0.5):IF CH<1 THEN 430
400 FOR K=1 TO CH
410 POSITION C,19-K:PRINT BS(1,LW)
420 NEXT K
430 C=C+INT(38/I):NEXT J
440 POSITION 20-LEN(TS)/2,21:PRINT TS
450 POSITION 6,23:PRINT "(PRESS ANY KEY TO CONTINUE.)"
;
459 REM --"POKE 752,0" TURNS CURSOR BACK ON--
460 POKE 752,0:GET #1,K
470 PRINT CHR$(125);"PRESS <D> TO DRAW ANOTHER GRAPH"
480 PRINT "OR <Q> TO QUIT.";
490 GET #1,KEY:IF KEY=ASC("Q") THEN END
500 IF KEY=ASC("D") THEN 40
510 GOTO 490
999 REM --SET UP SCREEN FOR INPUT--
1000 PRINT CHR$(125):POSITION 15,0:PRINT "*BAR GRAPH*"
1010 POSITION 3,22:PRINT "YOU HAVE ROOM LEFT FOR ";38-
I;" ITEM(S). "
1020 RETURN

```

Commodore 64/Bar Graph

```

10 DIM A(37),LS(37),KO(7)
20 FOR J=1 TO 7:READ KO(J):NEXT J
30 FOR J=1 TO 38:BS=BS+" ";:NEXT J
40 M=0:I=1:Z=1
49 REM --SET BORDER AND SCREEN COLORS--
50 POKE 53280,0:POKE 53281,0
59 REM --GET NAME OF ITEM--
60 GOSUB 1000:IF I<>20 THEN 100
70 POKE 214,3:PRINT:PRINT CHR$(28);"WARNING! IF YOU AD
D MORE ITEMS, THERE"
80 PRINT TAB(7);"WILL BE NO SPACE BETWEEN THE"
90 PRINT TAB(11);"BARS IN YOUR GRAPH."
99 REM --"POKE 214,7" PUTS CURSOR ON LINE 7+1--
100 POKE 214,7:PRINT

```

```

110 PRINT CHR$(5);"PLEASE ENTER THE NAME OF ITEM #";ST
R$(I);". "
120 IF I=1 THEN 150
130 PRINT "(JUST PRESS <RETURN> IF"
140 PRINT "YOU HAVE NO MORE ITEMS.)"
150 PRINT:LS(I)="" :INPUT LS(I)
160 IF LS(I)<>" " THEN 220
170 IF I=1 THEN 60
180 POKE 214,13:PRINT:PRINT CHR$(158);"ARE YOU FINISHE
D ENTERING ITEMS?";
190 GET K$:IF K$="" THEN 190
200 IF K$="Y" THEN 280
210 GOTO 60
219 REM --GET VALUE FOR THAT ITEM--
220 GOSUB 1000:POKE 214,7:PRINT
230 PRINT CHR$(5);"WHAT IS THE VALUE FOR"
240 PRINT "ITEM #";STR$(I);" (" ;LS(I);" )";
250 A(I)=0:INPUT A(I):IF A(I)<0 THEN 220
260 IF M<A(I) THEN M=A(I)
270 I=I+1:IF I<38 THEN 60
280 I=I-1:IF M=0 THEN M=1
290 PRINT CHR$(147);
300 PRINT CHR$(5);"WHAT IS THE TITLE OF YOUR GRAPH?"
310 PRINT:TS="" :INPUT TS:IF TS="" THEN 290
320 IF LEN(TS)>38 THEN TS=LEFT$(TS,38)
330 C=INT(21-(INT(38/I)*I)/2)
339 REM --DRAW GRAPH--
340 PRINT CHR$(147);CHR$(158):PRINT
350 PRINT TAB(C-1);CHR$(157);M
360 FOR J=1 TO 18:PRINT TAB(C-1);CHR$(125):NEXT J
370 PRINT TAB(C-1);"0"
380 LW=INT(38/I)+(I<20)
390 FOR J=1 TO I
400 PRINT CHR$(KO(Z))
410 POKE 214,20:PRINT:PRINT TAB(C);
420 IF LEN(LS(J))>=LW THEN PRINT LEFT$(LS(J),LW):GOTO
440
430 PRINT LS(J)
440 CH=INT(A(J)/M*18+0.5):IF CH<1 THEN 500
450 FOR K=1 TO CH
459 REM --"POKE 211,C" PUTS CURSOR IN COLUMN C+1--
460 POKE 214,20-K:PRINT:POKE 211,C
470 PRINT CHR$(18);LEFT$(BS,LW);CHR$(146)
480 NEXT K
490 Z=Z+1:IF Z=8 THEN Z=1
500 C=C+INT(38/I):NEXT J
510 POKE 214,21:PRINT
520 PRINT CHR$(5);TAB(20-LEN(TS)/2);CHR$(18);TS;CHR$(
46)
530 PRINT:PRINT TAB(6);"(PRESS ANY KEY TO CONTINUE.)";
540 GET K$:IF K$="" THEN 540
550 PRINT CHR$(147);"PRESS <D> TO DRAW ANOTHER GRAPH"
560 PRINT "OR <Q> TO QUIT."
570 GET K$:IF K$="" THEN 570
580 IF K$="Q" THEN END
590 IF K$="D" THEN 40
600 GOTO 570
999 REM --SET UP SCREEN FOR INPUT--
1000 PRINT CHR$(147);CHR$(153);TAB(15);"*BAR GRAPH*"
1010 POKE 214,20:PRINT
1020 PRINT CHR$(18);CHR$(28);
1030 PRINT TAB(2);" YOU HAVE ROOM LEFT FOR ";
1040 PRINT CHR$(146);38-I;
1050 PRINT CHR$(18);" ITEM(S). ";CHR$(146)
1060 RETURN
1999 REM --HERE ARE COLORS OF BARS--
2000 DATA 28,30,31,129,156,158,159

```

IBM PC W/Color Graphics Adapter & IBM PCjr/Bar Graph

```

10 WIDTH 40:KEY OFF:SCREEN 0,1
20 DIM A(37),LS(37)

```


PRODUCTIVITY PROGRAM

```

30 M=0:I=1:Z=1
39 REM --GET NAME OF ITEM--
40 GOSUB 1000:IF I<20 THEN 80
50 LOCATE 3,1:PRINT "WARNING! IF YOU ADD MORE ITEMS, T
HERE"
60 PRINT TAB(6);"WILL BE NO SPACE BETWEEN THE"
70 PRINT TAB(11);"BARS IN YOUR GRAPH."
80 LOCATE 7,1:PRINT "PLEASE ENTER THE NAME OF ITEM";ST
R$(I);"."
90 IF I=1 THEN 120
100 PRINT "(JUST PRESS <ENTER> IF"
110 PRINT "YOU HAVE NO MORE ITEMS.)"
120 PRINT:INPUT L$(I)
130 IF L$(I)<>"" THEN 180
140 IF I=1 THEN 40
150 LOCATE 11,1:PRINT "ARE YOU FINISHED ENTERING ITEMS
?";
160 K$=INKEY$:IF K$="" THEN 160
170 IF K$="Y" OR K$="y" THEN 230 ELSE 40
179 REM --GET VALUE FOR THAT ITEM--
180 GOSUB 1000:LOCATE 7,1:PRINT "WHAT IS THE VALUE FOR
"
190 PRINT "ITEM";I;"("L$(I);")";
200 INPUT A(I):IF A(I)<0 THEN 180
210 IF M<A(I) THEN M=A(I)
220 I=I+1:IF I<38 THEN 40
230 I=I-1:IF M=0 THEN M=1
240 CLS:PRINT "WHAT IS THE TITLE OF YOUR GRAPH?":PRINT
250 INPUT T$:IF T$="" THEN 240
260 IF LEN(T$)>38 THEN T$=LEFT$(T$,38)
270 C=INT(21-(INT(38/I)*I)/2)
279 REM --DRAW GRAPH--
280 CLS:PRINT TAB(C-1);RIGHT$(STR$(M),LEN(STR$(M))-1)
290 FOR J=1 TO 18:PRINT TAB(C-1);CHR$(124):NEXT J
300 PRINT TAB(C-1);"0"
310 LW=INT(38/I)+(I<20)
320 FOR J=1 TO I:LOCATE 21,C:COLOR Z
330 IF LEN(L$(J))>LW THEN PRINT LEFT$(L$(J),LW) ELSE
PRINT L$(J)
340 CH=INT(A(J)/M*18+.5)
350 FOR K=1 TO CH
360 LOCATE 20-K,C:PRINT STRING$(LW,219)
370 NEXT K
380 Z=Z+1:IF Z=6 THEN Z=1
390 C=C+INT(38/I):NEXT J
400 COLOR 7:LOCATE 22,20-LEN(T$)/2:PRINT T$
410 PRINT:PRINT TAB(7);"(PRESS ANY KEY TO CONTINUE.)";
420 K$=INKEY$:IF K$="" THEN 420 ELSE CLS
430 PRINT "PRESS <D> TO DRAW ANOTHER GRAPH"
440 PRINT "OR <Q> TO QUIT.";
450 K$=INKEY$:IF K$="" THEN 450
460 IF K$="Q" OR K$="q" THEN END
470 IF K$="D" OR K$="d" THEN 30 ELSE 450
999 REM --SET UP SCREEN FOR INPUT--
1000 CLS:PRINT TAB(14);"*BAR GRAPH*"
1010 LOCATE 22,3:PRINT "YOU HAVE ROOM LEFT FOR";
1011 COLOR 23:PRINT 38-I;:COLOR 7:PRINT "ITEM(S).";
1020 RETURN

```

TRS-80 Color Computer/Bar Graph

```

10 DIM A(29),L$(29)
20 M=0:I=1:Z=16
29 REM --GET NAME OF ITEM--
30 GOSUB 1000:IF I<16 THEN 70
40 PRINT@32,"WARNING! IF YOU ADD MORE ITEMS,"
50 PRINT "THERE WILL BE NO SPACE BETWEEN"
60 PRINT TAB(5);"THE BARS IN YOUR GRAPH."
70 PRINT@160,"PLEASE ENTER THE NAME"
80 PRINT "OF ITEM";STR$(I);"."
90 IF I=1 THEN 120
100 PRINT "(JUST PRESS <ENTER> IF"
110 PRINT "YOU HAVE NO MORE ITEMS.)"
120 INPUT L$(I):IF L$(I)<>"" THEN 180

```

```

130 IF I=1 THEN 30
140 PRINT@352,"ARE YOU FINISHED ENTERING ITEMS?"
150 K$=INKEY$:IF K$="" THEN 150
160 IF K$="Y" THEN 230
170 GOTO 30
179 REM --GET VALUE FOR THAT ITEM--
180 GOSUB 1000:PRINT@160,"WHAT IS THE VALUE FOR"
190 PRINT "ITEM";STR$(I);" ("L$(I);")";
200 INPUT A(I):IF A(I)<0 THEN 180
210 IF M<A(I) THEN M=A(I)
220 I=I+1:IF I<30 THEN 30
230 I=I-1:IF M=0 THEN M=1
240 CLS:PRINT "WHAT IS THE TITLE OF YOUR GRAPH?"
250 INPUT T$:IF T$="" THEN 240
260 IF LEN(T$)>30 THEN T$=LEFT$(T$,30)
270 C=INT(16-(INT(30/I)*I)/2)
279 REM --DRAW GRAPH--
280 CLS:PRINT TAB(C-1);RIGHT$(STR$(M),LEN(STR$(M))-1)
290 FOR J=1 TO 12:PRINT TAB(C-1);CHR$(201):NEXT J
300 PRINT TAB(C-1);"0"
310 LW=INT(30/I)+(I<16)
320 FOR J=1 TO I:PRINT@417+C,"";
330 IF LEN(L$(J))>LW THEN PRINT LEFT$(L$(J),LW) ELSE
PRINT L$(J)
340 CH=INT(A(J)/M*12+.5):IF CH<1 THEN 390
350 FOR K=1 TO CH
359 REM --PRINT COLORED BLOCKS--
360 PRINT@C+1+(13-K)*32,STRING$(LW,143+Z);
370 NEXT K
380 Z=Z+1:IF Z>112 THEN Z=16
390 C=C+INT(30/I):NEXT J
400 PRINT@448+(16-LEN(T$)/2),T$
410 PRINT " (PRESS ANY KEY TO CONTINUE.)";
420 K$=INKEY$:IF K$="" THEN 420
430 CLS:PRINT "PRESS <D> TO DRAW ANOTHER GRAPH"
440 PRINT "OR <Q> TO QUIT."
450 K$=INKEY$:IF K$="" THEN 450
460 IF K$="Q" THEN END
470 IF K$="D" THEN 20 ELSE 450
999 REM --SET UP SCREEN FOR INPUT--
1000 CLS:PRINT TAB(10);"*BAR GRAPH*"
1010 PRINT@421,"YOU HAVE ROOM LEFT FOR"
1020 PRINT TAB(10);30-I;"ITEM(S).";
1030 RETURN

```

TRS-80 Model III/Bar Graph

```

10 CLEAR 1000:DIM A(63),L$(63)
20 M=0:I=1
29 REM --GET NAME OF ITEM--
30 GOSUB 1000:IF I<32 THEN 70
40 PRINT@204,"WARNING! IF YOU ADD MORE ITEMS, THERE"
50 PRINT TAB(16);"WILL BE NO SPACE BETWEEN THE"
60 PRINT TAB(20);"BARS IN YOUR GRAPH."
70 PRINT@448,"PLEASE ENTER THE NAME OF ITEM";STR$(I);"."
80 IF I=1 THEN 100
90 PRINT "(JUST PRESS <ENTER> IF YOU HAVE NO MORE ITEM
S.)"
100 PRINT:L$(I)="" :INPUT L$(I)
110 IF L$(I)<>"" THEN 170
120 IF I=1 THEN 30
130 PRINT@640,"ARE YOU FINISHED ENTERING ITEMS?";
140 K$=INKEY$:IF K$="" THEN 140
150 IF K$="Y" OR K$="y" THEN 220
160 GOTO 30
169 REM --GET VALUE FOR THAT ITEM--
170 GOSUB 1000
180 PRINT@448,"WHAT IS THE VALUE FOR ITEM";I;"("L$(I)
;")";
190 A(I)=0:INPUT A(I):IF A(I)<0 THEN 170
200 IF M<A(I) THEN M=A(I)
210 I=I+1:IF I<63 THEN 30

```


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PRODUCTIVITY PROGRAM

```

220 I=I-1:IF M=0 THEN M=1
230 CLS:PRINT "WHAT IS THE TITLE OF YOUR GRAPH?"
240 PRINT:T$:="" :INPUT T$:IF T$="" THEN 230
250 IF LEN(T$)>62 THEN T$=LEFT$(T$,62)
260 C=INT(33-(INT(62/I)*I)/2)
269 REM --DRAW GRAPH--
270 CLS:PRINT TAB(C-1);RIGHT$(STR$(M),LEN(STR$(M))-1)
280 FOR J=1 TO 11:PRINT TAB(C-1);"" :NEXT J
290 PRINT TAB(C-1);"0"
300 LW=INT(62/I)+(I<32)
310 FOR J=1 TO I:PRINT@C+832,"";
320 IF LEN(L$(J))>=LW THEN PRINT LEFT$(L$(J),LW) ELSE
PRINT L$(J)
330 CH=INT(A(J)/M*11+0.5):IF CH<1 THEN 370
340 FOR K=1 TO CH
350 PRINT@C+64*(12-K),STRING$(LW,149);
360 NEXT K
370 C=C+INT(62/I):NEXT J
380 PRINT@C+928-LEN(T$)/2,T$
390 PRINT TAB(18);"(PRESS ANY KEY TO CONTINUE.)";
400 K$=INKEY$:IF K$="" THEN 400 ELSE CLS
410 PRINT "PRESS <D> TO DRAW ANOTHER GRAPH OR <Q> TO QUIT."
420 K$=INKEY$:IF K$="" THEN 420
430 IF K$="Q" OR K$="q" THEN END
440 IF K$="D" OR K$="d" THEN 20 ELSE 420
999 REM --SET UP SCREEN FOR INPUT--
1000 CLS:PRINT TAB(24);"*BAR GRAPH*"
1010 PRINT@908,"YOU HAVE ROOM LEFT FOR";63-I;"ITEM(S).
"
1020 RETURN

```

VIC-20/Bar Graph

```

10 DIM A(19),L$(19),K0(6)
20 FOR J=1 TO 6:READ K0(J):NEXT J
30 FOR J=1 TO 20:B$=B$+" ":NEXT J
40 M=0:I=1:Z=1
49 REM --SET SCREEN AND BORDER COLORS--
50 POKE 36879,8
59 REM --GET INPUT FROM USER--
60 IF I<11 THEN 140
70 PRINT CHR$(147);CHR$(158);"WARNING! IF YOU ADD"
80 PRINT "MORE ITEMS, THERE"
90 PRINT "WILL BE NO SPACE"
100 PRINT "BETWEEN THE BARS IN"
110 PRINT "YOUR GRAPH."
120 PRINT:PRINT:PRINT "(PLEASE PRESS A KEY.)"
130 GET K$:IF K$="" THEN 130
139 REM --"POKE 214,7" PUTS CURSOR ON LINE 7+1--
140 GOSUB 1000:POKE 214,7:PRINT
150 PRINT CHR$(5);"PLEASE ENTER THE"
160 PRINT "NAME OF ITEM";STR$(I);"."
170 IF I=1 THEN 210
180 PRINT "(JUST PRESS <RETURN>)"
190 PRINT "IF YOU HAVE NO MORE"
200 PRINT "ITEMS.)"
210 PRINT:L$(I)="" :INPUT L$(I)
220 IF L$(I)<>"" THEN 290
230 IF I=1 THEN 60
240 PRINT CHR$(147);CHR$(158);"ARE YOU FINISHED"
250 PRINT "ENTERING ITEMS?"
260 GET K$:IF K$="" THEN 260
270 IF K$="Y" THEN 350
280 GOTO 60
290 GOSUB 1000:POKE 214,7:PRINT
300 PRINT CHR$(5);"WHAT IS THE VALUE"
310 PRINT "FOR ITEM";STR$(I);" (";L$(I);")?"
320 PRINT:A(I)=0:INPUT A(I):IF A(I)<0 THEN 290
330 IF M<A(I) THEN M=A(I)
340 I=I+1:IF I<20 THEN 60
350 I=I-1:IF M=0 THEN M=1
360 PRINT CHR$(147);CHR$(5);"WHAT IS THE TITLE OF"

```

```

370 PRINT "YOUR GRAPH?"
380 PRINT:T$="" :INPUT T$:IF T$="" THEN 360
390 IF LEN(T$)>22 THEN T$=LEFT$(T$,22)
400 C=INT(12-(INT(20/I)*I)/2)
409 REM --DRAW GRAPH--
410 PRINT CHR$(147);TAB(C-1);CHR$(157);CHR$(158);M
420 FOR J=1 TO 18:PRINT TAB(C-1);CHR$(125):NEXT J
430 PRINT TAB(C-1);"0"
440 LW=INT(20/I)+(I<11)
450 FOR J=1 TO I
460 PRINT CHR$(K0(Z))
470 POKE 214,19:PRINT:PRINT TAB(C);
480 IF LEN(L$(J))>=LW THEN PRINT LEFT$(L$(J),LW):GOTO 500
490 PRINT L$(J)
500 CH=INT(A(J)/M*18+0.5):IF CH<1 THEN 560
510 FOR K=1 TO CH
520 POKE 214,18-K:PRINT
530 PRINT TAB(C);CHR$(18);LEFT$(B$,LW);CHR$(146)
540 NEXT K
550 Z=Z+1:IF Z=7 THEN Z=1
560 C=C+INT(20/I):NEXT J
570 POKE 214,20:PRINT
580 PRINT CHR$(5);TAB(11-LEN(T$)/2);CHR$(18);T$;CHR$(146)
590 PRINT "(PLEASE PRESS A KEY.)";
600 GET K$:IF K$="" THEN 600
610 PRINT CHR$(147);"PRESS <D> TO DRAW"
620 PRINT "ANOTHER GRAPH OR"
630 PRINT "<Q> TO QUIT."
640 GET K$:IF K$="" THEN 640
650 IF K$="Q" THEN END
660 IF K$="D" THEN 40
670 GOTO 640
999 REM --SET UP SCREEN FOR INPUT--
1000 PRINT CHR$(147):PRINT CHR$(153);TAB(5);"*BAR GRAPH*"
1010 POKE 214,19:PRINT
1020 PRINT CHR$(18);CHR$(28);TAB(2);"YOU HAVE ROOM LEFT"
1030 PRINT CHR$(18);TAB(3);"FOR";CHR$(146);20-I;CHR$(18);
"ITEM(S).";CHR$(146);
1040 RETURN
1999 REM --HERE ARE COLORS OF BARS--
2000 DATA 28,30,31,156,158,159

```

SOLUTION TO MAGICAL MESSAGES

The clues to this month's puzzle are like The Chameleon himself: everywhere. If you've checked the illustration and the text carefully, you will find that Bob Ringwood is the only character who can be linked to all of the nine characteristics spelled out by the computer: (is drinking with his left hand); (classes) (is wearing eyeglasses); (stripes) (flag on his space suit); (text mentions that his costume was hot); (foot arrived at the meeting on foot); (fizz (drank soda pop); (scratched his ear while searching for clues); (ring (part of his name); and west (sat at west end of table, as shown by setting Upon discovering that it was Ringwood, the group requested that he unmask himself. Ringwood reluctantly agreed. He removed the space suit to expose yet another costume: a grotesque Frankenstein-like monster. He peeled away that costume to expose a medieval knight. The knight removed his suit of armor and underneath was a brightly colored peacock. Finally, the peacock shed its feathers to reveal a small, green, lizardlike creature, a chameleon, which crawled under a crack in the door and disappeared.

DISGUISES AT DUSK

Which One Hides an Impostor?

PUZZLE BY PETER FAVARO AND SARAH KORTUM
PROGRAM BY STEVEN C.M. CHEN

If you're not a puzzle fan, you can still have fun with this program. See "A Built-in 'Oracle'" and "Customizing the Message."

When the *Sodaville Gazette* reported on a mysterious crime fighter, the small hamlet had a new folk hero. He (or she?) was known as "The Chameleon" because of his (her?) habit of donning all kinds of disguises to combat Sodaville's regular thugs, punks, and small-time operators. Why, just last week The Chameleon foiled a plot to steal one of Farmer Hansen's prize 100-pound pea pods by posing as a monstrous legume. After bursting from the pod, The Chameleon mesmerized the poachers with a hypnotic spell until police arrived on the scene.

The Chameleon was such a popular hero that several local children formed a club to honor this character of a thousand disguises. The club met each day at dusk to try to crack famous, unsolved mysteries. The children used a computer that, mysteriously, acted like a Ouija board: When they all pressed down the space bar together, words that were vital clues to the unsolved mysteries would be spelled out on the screen. The club members believed that their hero was communicating to them through the computer.



The members never revealed their true identities to each other, always coming to meetings in disguise. They even had to sign in with assumed names. Today there were four members in atten-

dance: "Marla West," a secret agent; "Hopalong Jones," a rugged cowboy; "Marcus Felini," a notorious cat burglar; and "Bob Ringwood," a brave space-shuttle pilot.

The members assembled

minutes before sunset. Hopalong and the shuttle pilot arrived on foot; the others came by bike. The secret agent offered to take the meeting's minutes. Refreshments were served by Felini. Marla had hot choc-

olate, and Hopalong drank a mug of steaming tea. Felini and Ringwood had soda pop since both were clad in hot costumes and needed to cool off. Felini had an extra glass of ice water to quench his thirst.

Just as the meeting was about to begin, Bob noticed that Felini's muddy sneakers were marking up the floor. "Some cat burglar," he snorted, "leaving footprints all over the place!" Seconds later the phone rang. Marla picked it up and afterward claimed that it was her mother, reminding her to take some poison-ivy medication. For emphasis, she raked her side and squirmed around acting itchy. The cowboy took off his 10-gallon hat, scratched his head, and gave Marla a funny look.

A crime was chosen from a long list of unsolved mysteries. But when the computer was turned on and everyone had a finger on the space bar, the words IMPOSTOR PRESENT . . . MEETING CANNOT CONTINUE were spelled out on the screen. Could it be that in their midst was someone who wasn't a member of the club?

They eyed each other suspiciously. Marla was twitching, but that could have been the poison ivy. The cowboy nervously fingered his hat while his eyes darted from person to person. Ringwood scratched his ear and searched the room for clues. Felini offered a series of quick but shabby reasons why he couldn't possibly be the impostor. The cowboy had a ready rejoinder to Felini's cries of innocence: "A guilty conscience needs no accuser, pardner."

Then the secret agent had a brilliant idea. To solve the mystery of who was the impostor, why not proceed as they did when solving any other mystery: Ask the computer for clues! They all crowded around the keyboard, and as they held down the

space bar, nine of the impostor's characteristics were spelled out on the screen, one after another, over and over. Unfortunately, the kids soon discovered that many of these characteristics were shared by more than one of them. They realized that it was not going to be easy to discover who among them was the only one to have all nine of the characteristics.

HOW TO PLAY

Type each line of the program into your computer exactly as shown, carefully making the appropriate modifications, if needed. (See "Tips to the Typist," page 46, for help with typing in programs.) Then SAVE it to disk or cassette. Before RUNNING the program, make sure to set your computer to all upper-case letters. Also, double-check lines 5000 and 5010 to make sure you used all capital letters for the DATA.

When the program begins, the 26 letters of the alphabet appear on the screen, along with a symbol representing the planchette of a Ouija board. Just hold down the space bar to make the planchette move from letter to letter, spelling out words. Removing your hand from the space bar at any time stops the motion; depressing it again makes the motion resume. At the end of each word, the planchette will return to its "home" position near the center of the screen, and you'll have to release the space bar and press it down again to make the planchette resume its motion. Press the "Q" key at any time to stop the program.

The same nine clues will be spelled out over and over again. If you study them carefully in conjunction with the story line and the illustration, you should be able to figure out who the impostor is. Once you've fingered the culprit, you can check your answer against the solution on page 58.

A BUILT-IN 'ORACLE'

You can use this month's program, *Magical Messages*, in three different ways. When you first RUN the program, your computer will act just like the one in the children's club, spelling out the impostor's characteristics. But you can also have fun with the program after you've solved the puzzle, or instead of working on the puzzle at all.

You can change the program so it will spell out a message you choose (see "Customizing the Message"). Or, you can press the "Y" key at any time to move to a different screen displaying the words YES, NO, and MAYBE. You can then ask the computer any yes or no question, and when you hold down the space bar, the planchette will move to a random answer. (Again, make sure you release the space bar after the planchette returns "home" before asking the next question.) But beware of asking questions like "Am I the prettiest one of all?"—we can't guarantee that the computer will give correct answers!

CUSTOMIZING THE MESSAGE

You can customize the program to fool your friends! The program can spell out any words you like. Just follow these four simple steps:

1. Delete lines 5000 and 5010.
2. Type in new DATA statements, starting at line 5000, that contain the line number, the word DATA, and the words you want spelled out—in all caps—separated by commas. For example, to make the program spell out the message IMPOSTOR PRESENT MEETING CANNOT CONTINUE, you would add one new state-

ment:

5000 DATA IMPOSTOR, PRESENT, MEETING, CANNOT, CONTINUE

3. Change NUM=9 in line 10 to reflect the number of words in your DATA statements. In the case of our example, you'd change NUM=9 to NUM=5.

4. Retype line 80 (line 110 in the Atari version), removing the word REM. Line 80 will now read as follows:

```
80 FOR I=1 TO NUM:PT(I)
  =I:NEXT I:GOTO 170
except for the Atari version, where you'll change
line 110 to read
110 FOR I=1 TO NUM:PT
(I)=I:NEXT I:GOTO 210
```

PROGRAM NOTES

Although the way the planchette moves may look uneven, the method used to compute its path is actually quite sophisticated. The jagged appearance comes from the fact that we're working in a very low-resolution mode: the text screen. The motion is irregular because of a pause of random length between moves, designed to simulate the jerky motion of a real planchette.

The program actually computes the mathematical equation for a circle that runs through the starting and ending points of a particular path. If we used the very same equation on a computer with an ultra-hi-res mode, the planchette would move from one letter to another along an almost perfect curve. Note to programmers: If your computer has a hi-res graphics mode but no curve-drawing commands, studying this program may help you learn how to write BASIC programs that draw hi-res circles and arcs.

Apple/Magical Messages

```
10 NUM = 9
20 DIM W$(NUM), F(3), PT(NUM), RN(NUM), HP(26), VP(26)
30 DL = 400:SP = 2:LS = 1:RM = 40:MS = CHR$(127)
40 HP(0) = INT(RM/2):VP(0) = 12:RC = 0
50 F(1) = 1:F(2) = 7:F(3) = 13
70 FOR I = 1 TO NUM:READ W$(I):RN(I) = RND(1):NEXT I
80 REM FOR I = 1 TO NUM:PT(I) = I:NEXT I:GOTO 170
90 FOR I = 1 TO NUM:PT(I) = I:FOR J = 1 TO NUM
100 IF RN(J) > RN(PT(I)) THEN PT(I) = J
```



```

110 NEXT J:RN(PT(I)) = 0:NEXT I
120 FOR I = 1 TO NUM:TS = "":AS = WDS(I)
130 V = ASC(LEFT$(AS,1))-64:FOR J = 2 TO LEN(AS)
140 N = ASC(MID$(AS,J,1))-V
150 TS = TS+CHR$(N+26*(N < 65)):NEXT J
160 WDS(I) = TS:NEXT I
170 HOME:FOR I = 1 TO 13:HP(I) = I+SP*(I-1)+LS
180 HP(I+13) = HP(I):VP(I) = 2:VP(I+13) = 23:NEXT I
190 FOR I = 1 TO 26:VTAB VP(I)+1-2*(I < 14)
200 HTAB HP(I):PRINT CHR$(I+64);:NEXT I
210 X1 = HP(0):Y1 = VP(0):TX = X1:TY = Y1
220 XP = X1:YP = Y1:GOSUB 1090:FLAG = 0
230 FOR I = 1 TO NUM:TS = WDS(PT(I))+""
240 FOR J = 1 TO LEN(TS):P = ASC(MID$(TS,J,1))-64
250 IF P < 0 OR P > 26 THEN 280
260 X2 = HP(P):Y2 = VP(P):GOSUB 2000
270 FOR D = 1 TO DL/5+RND(1)*DL/5:NEXT D
280 NEXT J:IF FLAG THEN 300
290 GOSUB 3000:FOR D = 1 TO DL:NEXT D
300 NEXT I:IF NOT FLAG THEN 230
310 HOME:T = HP(7)-HP(1)-4
320 PRINT SPC(15-1);"YES";SPC(T);"MAYBE";SPC(T);"NO"
330 FLAG = 0:X1 = HP(20):Y1 = VP(20)
340 TX = X1:TY = Y1:XP = X1:YP = Y1:GOSUB 1090
350 RC = INT(RND(1)*3)+1
360 X2 = HP(F(RC)):Y2 = VP(F(RC)):GOSUB 2000
370 X2 = HP(20):Y2 = VP(20):GOSUB 2000
380 GOSUB 3000:GOTO 350
1000 POKE -16368,0:K = PEEK(-16368)-128:Z = RND(1)
1010 ON K < 0 GOTO 1000:K = CHR$(K)
1020 IF K$ = CHR$(32) THEN 1080
1030 IF K$ <> "Y" AND K$ <> "Q" THEN 1000
1040 IF K$ = "Y" AND RC > 0 THEN 1000
1050 IF K$ = "Q" THEN END
1060 FLAG = 1:I = NUM:J = 254
1070 X = X2-XC:Y = Y2-YC:RETURN
1080 HTAB TX:VTAB TY:PRINT CHR$(32);
1090 HTAB XP:VTAB YP:PRINT MS;CHR$(8);
1100 TX = XP:TY = YP:RETURN
2000 DX = X2-X1:DY = Y2-Y1
2010 IF DX <> 0 OR DY <> 0 THEN 2070
2020 XP = X1:Y2 = Y1-7
2030 IF P < 14 THEN Y2 = Y1+7
2040 FOR C = 1 TO 2:FOR YP = Y1 TO Y2 STEP SGN(Y2-Y1)
2050 FOR D = 1 TO DL/8:NEXT D:GOSUB 1000:NEXT YP
2060 T = Y1:Y1 = Y2:Y2 = T:NEXT C:RETURN
2070 XM = (X1+X2)/2:YM = (Y1+Y2)/2
2080 IF DX = 0 OR DY = 0 THEN 2160
2090 XC = X1+(X2 > X1)*DX
2100 IF XM < HP(0) THEN XC = X2-(X1 < X2)*DX
2110 YC = YM-DX/DY*(XC-XM)
2120 R = SQR((XC-X2)^2+(YC-Y2)^2)+1E-05
2130 IF ABS(DY) > ABS(DX) THEN RD = 1-2*(XM >= HP(0)):
GOTO 2250
2140 RT = ((XM < HP(0))+(SGN(DX)+SGN(DY) <> 0)) = 1)
2150 RD = 2*RT-1:GOTO 2220
2160 RD = 1:R = (ABS(DX)+ABS(DY))/2
2170 XC = XM:YC = YM:IF DX = 0 THEN 2200
2180 IF P > 13 THEN RD = -1
2190 GOTO 2220
2200 IF X1+R > RM THEN RD = -1
2210 GOTO 2250
2220 FOR X = X1-XC TO X2-XC STEP SGN(DX)
2230 XP = X+XC:YP = RD*SQR(R*R-X*X)+YC+0.2
2240 GOSUB 1000:NEXT X:GOTO 2280
2250 FOR Y = Y1-YC TO Y2-YC STEP SGN(DY)
2260 XP = RD*SQR(R*R-Y*Y)+XC+0.2:YP = Y+YC
2270 GOSUB 1000:NEXT Y
2280 IF FLAG THEN RETURN
2290 IF XP = X2 AND YP = Y2 THEN 2310
2300 XP = X2:YP = Y2:GOSUB 1000
2310 X1 = X2:Y1 = Y2:RETURN
3000 POKE -16368,0:IF PEEK(-16368) = 160 THEN 3000
3010 K = PEEK(-16368)-128:IF K = 32 THEN RETURN
3020 IF K = 81 THEN END
3030 IF K <> 89 OR RC <> 0 THEN 3010
3040 FLAG = 1:I = NUM:J = 254

```

```

3050 X = X2-XC:Y = Y2-YC:RETURN
5000 DATA WIBCQV,TAFUMMYM,LEFDUBQE,FNUZ,PVEEJ
5010 DATA CILCC,PISHQJSX,MEVAT,XUCQR

```

Atari/Magical Messages

```

10 NUM=9
20 DIM AS(20),CL$(1),SS(14),TS(20),WDS(NUM*20)
30 DIM F(3),PT(NUM),RN(NUM),HP(26),VP(26),WP(NUM+1)
40 POKE 752,1:POKE 82,0:SETCOLOR 2,0,0
50 CL$=CHR$(125):SS$="" :SS(14)="" :SS(2)=SS
60 HP(0)=20:VP(0)=12:RC=0
70 F(1)=1:F(2)=7:F(3)=13
80 FOR I=1 TO NUM:READ TS:WP(I)=LEN(WDS)+1
90 WDS(WP(I))=TS:RN(I)=RND(1):NEXT I
100 WP(NUM+1)=LEN(WDS)+1
110 REM FOR I=1 TO NUM:PT(I)=I:NEXT I:GOTO 210
120 FOR I=1 TO NUM:PT(I)=I
130 FOR J=1 TO NUM:IF RN(J)>RN(PT(I)) THEN PT(I)=J
140 NEXT J:RN(PT(I))=0:NEXT I
150 FOR I=1 TO NUM:TS$="" :AS=WDS(WP(I),WP(I+1)-1)
160 V=ASC(AS(1,1))-64:FOR J=2 TO LEN(AS)
170 N=ASC(AS(J,1))-V:TS=LEN(TS)+1=CHR$(N+26*(N<65))
180 NEXT J:WP(I)=WP(I)-I+(I=1)
190 WDS(WP(I),WP(I)+LEN(TS)-1)=TS:NEXT I
200 WP(NUM+1)=WP(NUM+1)-NUM-1
210 PRINT CL$;:FOR I=1 TO 13:HP(I)=I+2*(I-1)+1
220 HP(I+13)=HP(I):VP(I)=2:VP(I+13)=23:NEXT I
230 FOR I=1 TO 26:POSITION HP(I)-1,VP(I)-2*(I<14)
240 PRINT CHR$(I+64);:NEXT I
250 X1=HP(0):Y1=VP(0):TX=X1:TY=Y1
260 XP=X1:YP=Y1:GOSUB 1070:FLAG=0
270 FOR I=1 TO NUM:TS=WDS(WP(PT(I)),WP(PT(I)+1)-1)
280 TS(LEN(TS)+1)="a":FOR J=1 TO LEN(TS)
290 P=ASC(TS(J,1))-64:IF P<0 OR P>26 THEN 310
300 X2=HP(P):Y2=VP(P):GOSUB 2000
310 NEXT J:IF FLAG THEN 330
320 GOSUB 3000:FOR D=1 TO 10:NEXT D
330 NEXT I:IF NOT FLAG THEN 270
340 PRINT CL$;"YES";SS;"MAYBE";SS;"NO"
350 FLAG=0:X1=HP(20):Y1=VP(20):TX=X1:TY=Y1
360 XP=X1:YP=Y1:GOSUB 1070
370 RC=INT(RND(1)*3)+1
380 X2=HP(F(RC)):Y2=VP(F(RC)):GOSUB 2000
390 X2=HP(20):Y2=VP(20):GOSUB 2000
400 GOSUB 3000:GOTO 370
1000 K=PEEK(764):POKE 764,255:Z=RND(1)
1010 IF K=33 THEN 1060
1020 IF K<>43 AND K<>47 THEN 1000
1030 IF K=43 AND RC>0 THEN 1000
1040 IF K=47 THEN POKE 752,0:END
1050 FLAG=1:I=NUM:J=254:X=X2-XC:Y=Y2-YC:RETURN
1060 POSITION TX-1,TY-1:PRINT CHR$(32);
1070 POSITION XP-1,YP-1:PRINT CHR$(123);
1080 TX=XP:TY=YP:RETURN
2000 DX=X2-X1:DY=Y2-Y1:IF DX<>0 OR DY<>0 THEN 2050
2010 XP=X1:Y2=Y1-7:IF P<14 THEN Y2=Y1+7
2020 FOR C=1 TO 2:FOR YP=Y1 TO Y2 STEP SGN(Y2-Y1)
2030 FOR D=1 TO 10:NEXT D:GOSUB 1000:NEXT YP
2040 T=Y1:Y1=Y2:Y2=T:NEXT C:RETURN
2050 XM=(X1+X2)/2:YM=(Y1+Y2)/2
2060 IF DX=0 OR DY=0 THEN 2140
2070 XC=X1+(X2>X1)*DX
2080 IF XM<0 THEN XC=X2-(X1<X2)*DX
2090 YC=YM-DX/DY*(XC-XM)
2100 R=SQR((XC-X2)^2+(YC-Y2)^2)+1E-03
2110 IF ABS(DY)>ABS(DX) THEN RD=1-2*(XM>=0):GOTO 2230
2120 RT=((XM<0)+(SGN(DX)+SGN(DY)<>0))=1)
2130 RD=2*RT-1:GOTO 2200
2140 RD=1:R=(ABS(DX)+ABS(DY))/2
2150 XC=XM:YC=YM:IF DX=0 THEN 2180
2160 IF P>13 THEN RD=-1
2170 GOTO 2200
2180 IF X1+R>40 THEN RD=-1
2190 GOTO 2230
2200 FOR X=X1-XC TO X2-XC STEP SGN(DX)
2210 XP=X+XC:YP=RD*SQR(R*R-X*X)+0.2+YC
2220 GOSUB 1000:NEXT X:GOTO 2260

```



```

2230 FOR Y=Y1-YC TO Y2-YC STEP SGN(DY)
2240 XP=RD*SQR(R*R-Y*Y)+XC+.2:YP=Y+YC
2250 GOSUB 1000:NEXT Y
2260 IF FLAG THEN RETURN
2270 IF XP=X2 AND YP=Y2 THEN 2290
2280 XP=X2:YP=Y2:GOSUB 1000
2290 X1=X2:Y1=Y2:RETURN
3000 IF PEEK(753)<>0 THEN 3000
3010 K=PEEK(764):POKE 764,255:IF K=33 THEN RETURN
3020 IF K=47 THEN POKE 752,0:END
3030 IF K>43 OR RC<>0 THEN 3010
3040 FLAG=1:I=NUM:J=254:X=X2-XC:Y=Y2-YC:RETURN
5000 DATA WIBCQV,TAFUMMYM,LEFDUBQE,FNUZ,PVEEJ
5010 DATA CILCC,PISHQJSX,MEVAT,XUCQR

```

Commodore 64/Magical Messages

```

10 POKE 53281,12:POKE 53280,12:NUM=9
20 DIM W$(NUM),F(4),PT(NUM),RN(NUM),HP(26),VP(26)
30 DL=250:SP=2:LS=1:CLS=CHR$(147):PRINT CHR$(142);CHR$(5);CHR$(8)
40 RM=40:BM=23:MAX=7
50 HP(0)=INT((1+RM)/2):VP(0)=INT((1+BM)/2)
60 RC=0:F(1)=1:F(2)=7:F(3)=13
70 FOR I=1 TO NUM:READ W$(I):RN(I)=RND(1):NEXT I
80 REM FOR I=1 TO NUM:PT(I)=I:NEXT I:GOTO 170
90 FOR I=1 TO NUM:PT(I)=I
100 FOR J=1 TO NUM:IF RN(J)>RN(PT(I)) THEN PT(I)=J
110 NEXT J:RN(PT(I))=0:NEXT I
120 FOR I=1 TO NUM:TS="":AS=W$(I)
130 V=ASC(LEFT$(AS,1))-64:FOR J=2 TO LEN(AS)
140 N=ASC(MID$(AS,J,1))-V
150 TS=TS+CHR$(N-26*(N<65)):NEXT J
160 W$(I)=TS:NEXT I
170 PRINT CL$:FOR I=1 TO 13:HP(I)=I+SP*(I-1)+LS
180 HP(I+13)=HP(I):VP(I)=1:VP(I+13)=BM:NEXT I
190 FOR I=1 TO 13:PRINT TAB(HP(I)-1);CHR$(I+64);
200 NEXT I:POKE 214,BM:PRINT:FOR I=14 TO 26
210 PRINT TAB(HP(I)-1);CHR$(I+64);:NEXT I
220 X1=HP(0):Y1=VP(0):TX=X1:TY=Y1
230 XP=X1:YP=Y1:GOSUB 1060:FLAG=0
240 FOR I=1 TO NUM:TS=W$(PT(I))+""
250 FOR J=1 TO LEN(TS):P=ASC(MID$(TS,J,1))-64
260 IF P<0 OR P>26 THEN 290
270 X2=HP(P):Y2=VP(P):GOSUB 2000
280 FOR D=1 TO DL/5+RND(1)*DL/5:NEXT D
290 NEXT J:IF FLAG THEN 310
300 GOSUB 3000:FOR D=1 TO DL:NEXT D
310 NEXT I:IF NOT FLAG THEN 240
320 PRINT CL$:T=HP(7)-HP(1)-4
330 PRINT SPC(LS-1);"YES";SPC(T);"MAYBE";SPC(T);"NO"
340 FLAG=0:X1=HP(20):Y1=VP(20):TX=X1:TY=Y1
350 XP=X1:YP=Y1:GOSUB 1060
360 RC=INT(RND(1)*3)+1
370 X2=HP(F(RC)):Y2=VP(F(RC)):GOSUB 2000
380 X2=HP(20):Y2=VP(20):GOSUB 2000
390 GOSUB 3000:GOTO 360
1000 GET K$:IF K$=CHR$(32) THEN 1050
1010 IF K$<>"Y" AND K$<>"Q" THEN 1000
1020 IF K$="Y" AND RC>0 THEN 1000
1030 IF K$="Q" THEN END
1040 FLAG=-1:I=NUM:J=254:X=X2-XC:Y=Y2-YC:RETURN
1050 POKE 214,TY-1:PRINT:PRINT TAB(TX-1);CHR$(32);
1060 POKE 214,YP-1:PRINT:PRINT TAB(XP-1);CHR$(97);
1070 TX=XP:TY=YP:RETURN
2000 DX=X2-X1:DY=Y2-Y1:IF DX<>0 OR DY<>0 THEN 2050
2010 XP=X1:Y2=Y1-MAX:IF P<14 THEN Y2=Y1+MAX
2020 FOR C=1 TO 2:FOR YP=Y1 TO Y2 STEP SGN(Y2-Y1)
2030 FOR D=1 TO DL/5:NEXT D:GOSUB 1000:NEXT YP
2040 T=Y1:Y1=Y2:Y2=T:NEXT C:RETURN
2050 XM=(X1+X2)/2:YM=(Y1+Y2)/2
2060 IF DX=0 OR DY=0 THEN 2140
2070 XC=X1-(X2-X1)*DX
2080 IF XM<HP(0) THEN XC=X2+(X1-X2)*DX
2090 YC=YM-DX/DY*(XC-XM)
2100 R=SQR((XC-X2)^2+(YC-Y2)^2)+1E-5
2110 IF ABS(DY)>ABS(DX) THEN RD=1+2*(XM=HP(0)):GOTO 2
230

```

```

2120 RT=((X<HP(0)))+(SGN(DX)+SGN(DY)<>0)=-1
2130 RD=-2*RT-1:GOTO 2200
2140 RD=1:R=(ABS(DX)+ABS(DY))/2
2150 XC=XM:YC=YM:IF DX=0 THEN 2180
2160 IF P>13 THEN RD=-1
2170 GOTO 2200
2180 IF X1+R>RM THEN RD=-1
2190 GOTO 2230
2200 FOR X=X1-XC TO X2-XC STEP SGN(DX)
2210 XP=X+XC:YP=RD*SQR(R*R-X*X)+YC+.2
2220 GOSUB 1000:NEXT X:GOTO 2260
2230 FOR Y=Y1-YC TO Y2-YC STEP SGN(DY)
2240 XP=RD*SQR(R*R-Y*Y)+XC+.2:YP=Y+YC
2250 GOSUB 1000:NEXT Y
2260 IF FLAG THEN RETURN
2270 IF XP=X2 AND YP=Y2 THEN 2290
2280 XP=X2:YP=Y2:GOSUB 1000
2290 X1=X2:Y1=Y2:RETURN
3000 IF PEEK(197)=60 THEN 3000
3010 GET K$:IF K$=CHR$(32) THEN RETURN
3020 IF K$="Q" THEN END
3030 IF K$<>"Y" OR RC<>0 THEN 3010
3040 FLAG=-1:I=NUM:J=254:X=X2-XC:Y=Y2-YC:RETURN
5000 DATA WIBCQV,TAFUMMYM,LEFDUBQE,FNUZ,PVEEJ
5010 DATA CILCC,PISHQJSX,MEVAT,XUCQR

```

IBM PC/Magical Messages

```

10 DEF SEG=0:RANDOMIZE=KEY OFF:NUM=9
20 DIM W$(NUM),F(3),PT(NUM),RN(NUM),HP(26),VP(26)
30 DL=300:SP=5:LS=3:RM=80
40 WIDTH RM:LOCATE ,0
50 HP(0)=INT((1+RM)/2):VP(0)=12
60 RC=0:F(1)=1:F(2)=7:F(3)=13
70 FOR I=1 TO NUM:READ W$(I):RN(I)=RND(1):NEXT I
80 REM FOR I=1 TO NUM:PT(I)=I:NEXT I:GOTO 170
90 FOR I=1 TO NUM:PT(I)=I
100 FOR J=1 TO NUM:IF RN(J)>RN(PT(I)) THEN PT(I)=J
110 NEXT J:RN(PT(I))=0:NEXT I
120 FOR I=1 TO NUM:TS="":AS=W$(I)
130 V=ASC(LEFT$(AS,1))-64:FOR J=2 TO LEN(AS)
140 N=ASC(MID$(AS,J,1))-V
150 TS=TS+CHR$(N-26*(N<65)):NEXT J
160 W$(I)=TS:NEXT I
170 CL$:FOR I=1 TO 13:HP(I)=I+SP*(I-1)+LS
180 HP(I+13)=HP(I):VP(I)=2:VP(I+13)=23:NEXT I
190 FOR I=1 TO 26:LOCATE VP(I)+2*(I<14)+1,HP(I)
200 PRINT CHR$(I+64);:NEXT I
210 X1=HP(0):Y1=VP(0):TX=X1:TY=Y1
220 XP=X1:YP=Y1:GOSUB 1060:FLAG=0
230 FOR I=1 TO NUM:TS=W$(PT(I))+""
240 FOR J=1 TO LEN(TS):P=ASC(MID$(TS,J,1))-64
250 IF P<0 OR P>26 THEN 280
260 X2=HP(P):Y2=VP(P):GOSUB 2000
270 FOR D=1 TO DL/5+RND(1)*DL/5:NEXT D
280 NEXT J:IF FLAG THEN 310
290 GOSUB 3000:FOR D=1 TO DL:NEXT D
300 NEXT I:IF NOT FLAG THEN 230
310 CL$:T=HP(7)-HP(1)-4
320 PRINT SPC(LS-1);"YES";SPC(T);"MAYBE";SPC(T);"NO"
330 FLAG=0:X1=HP(20):Y1=VP(20):TX=X1:TY=Y1
340 XP=X1:YP=Y1:GOSUB 1060
350 RC=INT(RND(1)*3)+1
360 X2=HP(F(RC)):Y2=VP(F(RC)):GOSUB 2000
370 X2=HP(20):Y2=VP(20):GOSUB 2000
380 GOSUB 3000:GOTO 350
1000 K$=INKEY$:Z=RND(1):IF K$=CHR$(32) THEN 1050
1010 IF K$<>"Y" AND K$<>"Q" THEN 1000
1020 IF K$="Y" AND RC>0 THEN 1000
1030 IF K$="Q" THEN END
1040 FLAG=-1:I=NUM:J=254:X=X2-XC:Y=Y2-YC:RETURN
1050 POKE 1050,PEEK(1052):LOCATE TY,TX:PRINT CHR$(32);
1060 LOCATE YP,XP:PRINT CHR$(148);
1070 TX=XP:TY=YP:RETURN
2000 DX=X2-X1:DY=Y2-Y1:IF DX<>0 OR DY<>0 THEN 2050
2010 XP=X1:IF P<14 THEN Y2=Y1+7 ELSE Y2=Y1-7
2020 FOR C=1 TO 2:FOR YP=Y1 TO Y2 STEP SGN(Y2-Y1)
2030 FOR D=1 TO DL/12:NEXT D:GOSUB 1000:NEXT YP

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```

2040 SWAP Y1,Y2:NEXT C:RETURN
2050 FD=1:XM=(X1+X2)/2:YM=(Y1+Y2)/2
2060 IF DX=0 OR DY=0 THEN 2140
2070 XC=X1-(X2>X1)*DX
2080 IF XM<HP(0) THEN XC=X2+(X1<X2)*DX
2090 YC=YM-DX/DY*(XC-XM)
2100 R=SQR((XC-X2)^2+(YC-Y2)^2)+.00001
2110 IF ABS(DY)>ABS(DX) THEN RD=1+2*(XM=HP(0)):GOTO 2
2120 RT=((XM<HP(0))+(SGN(DX)+SGN(DY)<0))=-1
2130 RD=-2*RT-1:GOTO 2210
2140 RD=1:R=(ABS(DX)+ABS(DY))/2
2150 XC=XM:YC=YM:IF DX=0 THEN 2190
2160 IF R>21 THEN FD=R/21
2170 IF P>13 THEN RD=-1
2180 GOTO 2210
2190 IF X1+R>RM THEN RD=-1
2200 GOTO 2240
2210 FOR X=X1-XC TO X2-XC STEP SGN(DX)
2220 XP=X+XC:YP=RD*SQR(R*R-X*X)/FD+YC+0.2
2230 GOSUB 1000:NEXT X:GOTO 2270
2240 FOR Y=Y1-YC TO Y2-YC STEP SGN(DY)
2250 XP=RD*SQR(R*R-Y*Y)+XC+.2:YP=Y+YC
2260 GOSUB 1000:NEXT Y
2270 IF FLAG THEN RETURN
2280 IF XP=X2 AND YP=Y2 THEN 2300
2290 XP=X2:YP=Y2:GOSUB 1000
2300 X1=X2:Y1=Y2:RETURN
3000 POKE 1050,PEEK(1052):FOR D=1 TO 200:NEXT D
3010 IF INKEY$=CHR$(32) THEN 3000
3020 K$=INKEY$:IF K$=CHR$(32) THEN RETURN
3030 IF K$="Q" THEN END
3040 IF K$<>"Y" OR RC<>0 THEN 3020
3050 FLAG=-1:I=NUM:J=254:X=X2-XC:Y=Y2-YC:RETURN
5000 DATA WIBCQV,TAFUMMYM,LEFDUBQE,FNUZ,PVEEJ
5010 DATA CILCC,PISHQJSX,MEVAT,XUCQR

```

TRS-80 Color Computer/Magical Messages

```

10 CLEAR 1000:NUM=9
20 DIM W$(NUM),F(3),PT(NUM),RN(NUM),HP(26),VP(26)
30 DL=200:SP=1:LS=3:WL=32
40 RM=WL:HP(0)=INT((1+RM)/2):VP(0)=8
60 RC=0:F(1)=1:F(2)=7:F(3)=13
70 FOR I=1 TO NUM:READ W$(I):RN(I)=RND(0):NEXT I
80 REM FOR I=1 TO NUM:PT(I)=I:NEXT I:GOTO 170
90 FOR I=1 TO NUM:PT(I)=I
100 FOR J=1 TO NUM:IF RN(J)>RN(PT(I)) THEN PT(I)=J
110 NEXT J:RN(PT(I))=0:NEXT I
120 FOR I=1 TO NUM:TS="":AS=W$(I)
130 V=ASC(LEFT$(AS,1))-64:FOR J=2 TO LEN(AS)
140 N=ASC(MID$(AS,J,1))-64
150 TS=TS+CHR$(N-26*(N<65)):NEXT J
160 W$(I)=TS:NEXT I
170 CLS:FOR I=1 TO 13:HP(I)=I+SP*(I-1)+LS
180 HP(I+13)=HP(I):VP(I)=2:VP(I+13)=15:NEXT I
190 FOR I=1 TO 26:P=(VP(I)+2*(I<14))*WL+HP(I)-1
200 PRINT@P,CHR$(I+64);:NEXT I
210 X1=HP(0):Y1=VP(0):TX=X1:TY=Y1
220 XP=X1:YP=Y1:GOSUB 1070:FLAG=0
230 FOR I=1 TO NUM:TS=W$(PT(I))+""
240 FOR J=1 TO LEN(TS):P=ASC(MID$(TS,J,1))-64
250 IF P<0 OR P>26 THEN 280
260 X2=HP(P):Y2=VP(P):GOSUB 2000
270 FOR D=1 TO DL/5+RND(DL/5):NEXT D
280 NEXT J:IF FLAG THEN 300
290 GOSUB 3000:FOR D=1 TO DL:NEXT D
300 NEXT I:IF NOT FLAG THEN 230
310 CLS:T=HP(7)-HP(1)-4
320 PRINT STRING$(LS-1,32);"YES";STRING$(T,32);"MAYBE"
;STRING$(T,32);"NO"
330 FLAG=0:X1=HP(20):Y1=VP(20):TX=X1:TY=Y1
340 XP=X1:YP=Y1:GOSUB 1070
350 RC=RND(3):X2=HP(F(RC)):Y2=VP(F(RC)):GOSUB 2000
360 X2=HP(20):Y2=VP(20):GOSUB 2000
370 GOSUB 3000:GOTO 350
1000 IF PEEK(345)=247 THEN 1060
1010 K$=INKEY$:Z=RND(0):IF K$=CHR$(32) THEN 1060

```

```

1020 IF K$<>"Y" AND K$<>"Q" THEN 1010
1030 IF K$="Y" AND RC>0 THEN 1010
1040 IF K$="Q" THEN END
1050 FLAG=-1:I=NUM:J=254:X=X2-XC:Y=Y2-YC:RETURN
1060 PRINT@P,CHR$(I+64);
1070 PRINT@P,CHR$(I+64);
1080 TX=XP:TY=YP:RETURN
2000 DX=X2-X1:DY=Y2-Y1:IF DX<>0 OR DY<>0 THEN 2050
2010 XP=X1:IF P<14 THEN Y2=Y1+4 ELSE Y2=Y1-4
2020 FOR C=1 TO 2:FOR YP=Y1 TO Y2 STEP SGN(Y2-Y1)
2030 FOR D=1 TO DL/5:NEXT D:GOSUB 1000:NEXT YP
2040 T=Y1:Y1=Y2:Y2=T:NEXT C:RETURN
2050 FD=1:XM=(X1+X2)/2:YM=(Y1+Y2)/2
2060 IF DX=0 OR DY=0 THEN 2140
2070 XC=X1-(X2>X1)*DX
2080 IF XM<HP(0) THEN XC=X2+(X1<X2)*DX
2090 YC=YM-DX/DY*(XC-XM)
2100 R=SQR((XC-X2)^2+(YC-Y2)^2)+1E-5
2110 IF ABS(DY)>ABS(DX) THEN RD=1+2*(XM=HP(0)):GOTO 2
2120 RT=((XM<HP(0))+(SGN(DX)+SGN(DY)<0))=-1
2130 RD=-2*RT-1:GOTO 2210
2140 RD=1:R=(ABS(DX)+ABS(DY))/2
2150 XC=XM:YC=YM:IF DX=0 THEN 2190
2160 IF R>13 THEN FD=R/13
2170 IF P>13 THEN RD=-1
2180 GOTO 2210
2190 IF X1+R>RM THEN RD=-1
2200 GOTO 2240
2210 FOR X=X1-XC TO X2-XC STEP SGN(DX)
2220 XP=X+XC:YP=INT(RD*SQR(R*R-X*X)/FD+YC+0.2)
2230 GOSUB 1000:NEXT X:GOTO 2270
2240 FOR Y=Y1-YC TO Y2-YC STEP SGN(DY)
2250 XP=RD*SQR(R*R-Y*Y)+XC+.2:YP=Y+YC
2260 GOSUB 1000:NEXT Y
2270 IF FLAG THEN RETURN
2280 IF XP=X2 AND YP=Y2 THEN 2300
2290 XP=X2:YP=Y2:GOSUB 1000
2300 X1=X2:Y1=Y2:RETURN
3000 IF PEEK(345)=247 THEN 3000
3010 K$=INKEY$:IF K$=CHR$(32) THEN RETURN
3020 IF K$="Q" THEN END
3030 IF K$<>"Y" OR RC<>0 THEN 3010
3040 FLAG=1:I=NUM:J=254:X=X2-XC:Y=Y2-YC:RETURN
5000 DATA WIBCQV,TAFUMMYM,LEFDUBQE,FNUZ,PVEEJ
5010 DATA CILCC,PISHQJSX,MEVAT,XUCQR

```

TRS-80 Model III/Magical Messages

```

10 CLEAR 1000:RANDOM:NUM=9
20 DIM W$(NUM),F(3),PT(NUM),RN(NUM),HP(26),VP(26)
30 DL=200:SP=4:LS=1:WL=64
40 RM=WL:HP(0)=INT((1+RM)/2):VP(0)=8
60 RC=0:F(1)=1:F(2)=7:F(3)=13
70 FOR I=1 TO NUM:READ W$(I):RN(I)=RND(0):NEXT I
80 REM FOR I=1 TO NUM:PT(I)=I:NEXT I:GOTO 170
90 FOR I=1 TO NUM:PT(I)=I
100 FOR J=1 TO NUM:IF RN(J)>RN(PT(I)) THEN PT(I)=J
110 NEXT J:RN(PT(I))=0:NEXT I
120 FOR I=1 TO NUM:TS="":AS=W$(I)
130 V=ASC(LEFT$(AS,1))-64:FOR J=2 TO LEN(AS)
140 N=ASC(MID$(AS,J,1))-64
150 TS=TS+CHR$(N-26*(N<65)):NEXT J
160 W$(I)=TS:NEXT I
170 CLS:FOR I=1 TO 13:HP(I)=I+SP*(I-1)+LS
180 HP(I+13)=HP(I):VP(I)=2:VP(I+13)=15:NEXT I
190 FOR I=1 TO 26:P=(VP(I)+2*(I<14))*WL+HP(I)-1
200 PRINT@P,CHR$(I+64);:NEXT I
210 X1=HP(0):Y1=VP(0):TX=X1:TY=Y1
220 XP=X1:YP=Y1:GOSUB 1070 :FLAG=0
230 FOR I=1 TO NUM:TS=W$(PT(I))+""
240 FOR J=1 TO LEN(TS):P=ASC(MID$(TS,J,1))-64
250 IF P<0 OR P>26 THEN 280
260 X2=HP(P):Y2=VP(P):GOSUB 2000
270 FOR D=1 TO DL/5+RND(DL/5):NEXT D
280 NEXT J:IF FLAG THEN 300
290 GOSUB 3000:FOR D=1 TO DL:NEXT D
300 NEXT I:IF NOT FLAG THEN 230

```


PUZZLE

```

310 CLS:T=HP(7)-HP(1)-4
320 PRINT STRING$(LS-1,32);"YES";STRING$(T,32);"MAYBE"
;STRING$(T,32);"NO"
330 FLAG=0:X1=HP(20):Y1=VP(20):TX=X1:TY=Y1
340 XP=X1:YP=Y1:GOSUB 1070
350 RC=RND(3):X2=HP(F(RC)):Y2=VP(F(RC)):GOSUB 2000
360 X2=HP(20):Y2=VP(20):GOSUB 2000
370 GOSUB 3000:GOTO 350
1000 IF INT(PEEK(14400)/128)=1 THEN 1060
1010 K$=INKEY$:IF K$=CHR$(32) THEN 1060
1020 IF K$<>"Y" AND K$<>"Q" THEN 1010
1030 IF K$="Y" AND RC>0 THEN 1010
1040 IF K$="Q" THEN END
1050 FLAG=-1:I=NUM:J=254:X=X2-XC:Y=Y2-YC:RETURN
1060 PRINT$(TY-1)*WL+TX-1,CHR$(32);
1070 PRINT$(YP-1)*WL+XP-1,CHR$(35);CHR$(24);
1080 TX=XP:TY=YP:RETURN
2000 DX=X2-X1:DY=Y2-Y1:IF DX<>0 OR DY<>0 THEN 2050
2010 XP=X1:IF P<14 THEN Y2=Y1+4 ELSE Y2=Y1-4
2020 FOR C=1 TO 2:FOR YP=Y1 TO Y2 STEP SGN(Y2-Y1)
2030 FOR D=1 TO DL/5:NEXT D:GOSUB 1000:NEXT YP
2040 T=Y1:Y1=Y2:Y2=T:NEXT C:RETURN
2050 FD=1:XM=(X1+X2)/2:YM=(Y1+Y2)/2
2060 IF DX=0 OR DY=0 THEN 2140
2070 XC=X1-(X2>X1)*DX
2080 IF XM<HP(0) THEN XC=X2+(X1<X2)*DX
2090 YC=YM-DX/DY*(XC-XM)
2100 R=SQR((XC-X2)^2+(YC-Y2)^2)+1E-5
2110 IF ABS(DY)>ABS(DX) THEN RD=1+2*(XM>HP(0)):GOTO 2
240
2120 RT=((XM<HP(0))+(SGN(DX)+SGN(DY)<>0))=-1
2130 RD=-2*RT-1:GOTO 2210
2140 RD=1:R=(ABS(DX)+ABS(DY))/2
2150 XC=XM:YC=YM:IF DX=0 THEN 2190
2160 IF R>13 THEN FD=R/13
2170 IF P>13 THEN RD=-1
2180 GOTO 2210
2190 IF X1+R>RM THEN RD=-1
2200 GOTO 2240
2210 FOR X=X1-XC TO X2-XC STEP SGN(DX)
2220 XP=X+XC:YP=INT(RD*SQR(R*R-X*X)/FD+YC+0.2)
2230 GOSUB 1000:NEXT X:GOTO 2270
2240 FOR Y=Y1-YC TO Y2-YC STEP SGN(DY)
2250 XP=RD*SQR(R*R-Y*Y)+XC+0.2:YP=Y+YC
2260 GOSUB 1000:NEXT Y
2270 IF FLAG THEN RETURN
2280 IF XP=X2 AND YP=Y2 THEN 2300
2290 XP=X2:YP=Y2:GOSUB 1000
2300 X1=X2:Y1=Y2:RETURN
3000 IF INT(PEEK(14400)/128)=1 THEN 3000
3010 K$=INKEY$:IF K$=CHR$(32) THEN RETURN
3020 IF K$="Q" THEN END
3030 IF K$<>"Y" OR RC<>0 THEN 3010
3040 FLAG=1:I=NUM:J=254:X=X2-XC:Y=Y2-YC:RETURN
5000 DATA WIBCQV,TAFUMMYM,LEFDUBQE,FNUZ,PVEEJ
5010 DATA CILCC,PISHQJSX,MEVAT,XUCQR

```

MODIFICATIONS FOR OTHER COMPUTERS

ADAM/Magical Messages

Use the Apple version, with the following alterations: Add lines 60 and 4000:

```

60 FOR i = 28000 TO 28005:READ a:POKE i,a:NEXT i
4000 DATA 62,0,50,117,253,201

```

Also, change lines 10, 30, 1000, 1010, 3000, and 3010 to read as follows:

```

10 LOMEM:29000:num = 9
30 dl = 800:sp = 1:ls = 3:rm = 31:m$ = CHR$(255)
1000 GET k$
1010 IF k$ = CHR$(3) THEN END
3000 IF PEEK(64885) = 32 THEN CALL 28000:FOR d = 1 TO
100:NEXT d:z=RND(1):GOTO 3000
3010 CALL 28000:k = PEEK(64885):IF k = 32 THEN RETURN

```

IBM PCjr/Magical Messages

Use the IBM PC version, except change line 30 to read as follows:

```

30 DL=400:SP=2:LS=1:RM=40

```

VIC-20/Magical Messages

Use the Commodore 64 version, except change lines 10, 30, 40, and 3000 to read as follows:

```

10 NUM=9
30 DL=300:SP=0:LS=4:CL$=CHR$(147):PRINT CHR$(142);CHR$
(8)
40 RM=22:BM=21:MAX=6
3000 IF PEEK(197)=32 THEN 3000

```

PROGRAMMING P.S.

Notes about previous months' programs

ADAM/A Musical Departure (February 1985, page 74)

A printing error made it difficult to tell where line 60 ended and line 70 began. Here are the lines:

```

60 b = 28000:FOR i = b TO b+5:READ a:POKE i,a:NEXT i
70 FOR i = 159 TO 223 STEP 32:POKE b+6,i:CALL 28000:NE
XT i

```

Commodore 64/Computer Valentine (February 1985, page 64)

A tiny speck snuck into line 430 during the printing process, making it difficult to read. Here's the line again:

```

430 FOR X=1 TO 20

```



Next 8 Pages!!

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Heaven For Hackers
Page 66

Edited by Anne Krueger

K-POWER

FOR THE COMPUTER GENERATION

A Whiz Kid Computerizes a Campground

When you think of camping, you probably think of lakes and trees and mountains. Tim Moody of Tupper Lake, New York, thinks of mountains, too—the mountains of paperwork it takes to run a campground. Tim is a summer employee of Fish Creek campground near Lake Placid. Last summer, during his third year of work there, he realized that part of his job—locating and keeping track of information on 350 campsites, and even more campers—was definitely a job for a computer.

Armed with only his Commodore 64 and a cassette recorder, 21-year-old Tim set out to make the Fish Creek campground the smoothest operation this side of the Mississippi . . . well, at least the most organized one.

"I suggested to the caretaker, Dan Phillips, that a computer would make our lives a lot easier," Tim remembers. "I went to work on developing a data base that would keep track of all the campsites, campers, dates in and out, and other informa-



Tim Moody and his computer whip Fish Creek campground into shape.

tion needed by the caretaker."

Tim's program (written in BASIC) was such a success that state officials visited Fish Creek campground to see how it worked. Now there is talk of using Tim's program at other campgrounds around the state. And the folks at Fish Creek are interested in extending the use of the computer to store additional files such as historical information, equipment inventory, and maintenance schedules.

Tim feels pretty good about all that. Especially since he recently received a call from the Department of Environmental Conservation to discuss a computing job with them!

—SUZETTE HARVEY

K-POWER Goes Electronic!

If you like the K-POWER section of FAMILY COMPUTING magazine, you're gonna love the *electronic K-POWER*! In fact, the electronic K-POWER is more than just an online version of the magazine; it is also a meeting place for other computer-using kids like you!

Here's how it works: If you own a modem and are a member of CompuServe, simply type GO FAM at any CompuServe prompt. (The command is GO FAM because the formal name of the electronic edition is FAMILY COMPUTING.) You'll find all sorts of interesting K-POWER stuff there, such as Dr. Cursor's Klinik, blips about what game designers are up to, fast-breaking industry news, programs, and more!

You can scan the information, download a program, or leave a message for FAMILY COMPUTING/K-POWER editors or other users. Plus, every month the FAMILY COMPUTING/K-POWER electronic edition will sponsor a conference where participants get to telecommunicate with interesting people, such as game authors, industry pros, and others.

Software Scoop!

Think you oughtta be in pictures? A company called Baudville makes it possible with its new *Take 1* animation software, which lets you write and direct your own cartoons and home movies (\$59). According to author Maurizio Barbatano, "Take 1 offers Apple users a tool that had been available only to movie producers and a handful of programmers." To be used with *Take 1*, Baudville offers companion libraries called *He-*

roes & Villains and *Actors & Actions*, \$30 each. . . . Broderbund Software's new mystery game called *Where in the World is Carmen Sandiego?* comes bundled with a copy of the *1985 World Almanac and Book of Facts*, plus a map of the world! \$39 for Apple II series. . . . For IBM PC and PCjr users, Broderbund introduces *The Ancient Art of War*—a new strategy game which contains 11 built-in war campaigns from the pages of history (\$44). . . . If you're wondering where Lucasfilm's *Ballblazer* and

Rescue on Fractalus! went—they're now being distributed by Epyx, along with *Summer Games II* (eight more ways to go for the gold), *Two-on-Two Sports* (volleyball, soccer, football, and baseball played against the computer or a friend), *The Right Stuff* (a flight-simulation game), and *Moreta: Dragonlady of Pern* (sequel to *Dragonriders of Pern*), among others. Each for less than \$30. . . . Also, don't miss Epyx's *Fast Load Cartridge*, about \$39, which loads Commodore disks five times faster than without it!

Computer Camps: Heaven for Hackers

If you're worried about how you're going to fill those long summer days ahead (when computer classes and clubs are on vacation), never fear! Summer means computer camps! We're talking about "hacker heaven," here . . . camps where you can enjoy all sorts of outdoor activities (sunshine . . . swimming . . . remem-



Camp can be "hacker heaven" for computer lovers.

ber?) combined with computer instruction ranging from the basics in BASIC; to composing and producing computer music, creating graphic designs, becoming an ace at word processing; or learning Logo, Pascal, or even more advanced languages. There is a camp out there for you, your computer system, your age group, and your interests—in your

area. It just takes a little looking.

To get you started, K-POWER put together a sampling of camps from around the country. These are just a few camps you might want to send away for info on—there are tons more you probably can find in local newspapers or the *Yellow Pages*, by asking computer teachers or at computer stores, or by calling your local board of recreation. There are sever-

al good books out there on camps, including *Camps 'n Computers*, from the American Camping Association and Verbatim Corp., 323 Soquel Way, Sunnyvale, CA 94086; (800) 538-1793 and *The Complete Guide to Computer Camps and Workshops*, published by Bobbs-Merrill Co., Inc., 630 Third Ave., New York, NY 10017; (212) 697-7050.

A Sampling of Summer Computer Camps:

COMPUTER TUTOR
980 Magnolia Ave.
Larkspur, CA 94939
(415) 461-7533;
(800) 227-2861
Camp located on Stanford University campus

EXPERCAMP (formerly
The Original Computer
Camp)
559 San Ysidro Road
Santa Barbara, CA 93108
(800) 235-6965
Camps located in California

**D.U.C.K./DUKE UNIVERSITY
COMPUTER KAMP**
Room 04 North Building,
Computer Science Dept.
Duke University
Durham, NC 27706
(919) 684-5645
Camp located on campus in North Carolina

**MARIST COLLEGE COMPUTER
CAMP**
Marist College
Poughkeepsie, NY 12601
(914) 471-3240 ext.345
Camp located in New York

MIDWEST COMPUTER CAMP
9392 Lafayette Road,
Unit C3
Indianapolis, IN 46278
(317) 297-2700
Camp located in Indiana

MT. RAINIER COMPUTER CAMP
9061 N.E. 34th St.
Bellevue, WA 98004
(206) 453-8790
Camp located in Washington

NATIONAL COMPUTER CAMPS
P.O. Box 585
Orange, CT 06477
(203) 795-9667
Camps located in Connecticut, Georgia, Ohio, Maryland, Missouri

**NEW ENGLAND COMPUTER
CAMP**
Banner Lodge
Moodus, CT 06469
(203) 873-1421
Camp located in Connecticut

**SESAME PLACE COMPUTER
CAMPS**
100 Sesame Road
Longhorne, PA 19047
(215) 752-7070
Camp located in Pennsylvania

**UNIVERSITY COMPUTER CAMPS
OF AMERICA**
2480 Crooks Road
Troy, MI 48084
(313) 362-4499
Camp located in Michigan

LOGON

L E T T E R S

STUCK ON ZORK

Your tips for Zork were great (November/December 1984 K-POWER). My friends and I have had Zork for two years and we still haven't figured it out. If you can tell me these three things, I think I could win:

1. How do you get into the Cyclops' room?
2. How do you get into Hades?
3. Print up a list of the 20 treasures.

I'm sure these tips will help other Zork fans. You make a great magazine!

ROBERT FEIGLEY
Baltimore, Maryland

Dear Robert,

Your wish is our command! According to 14-year-old hintster Tim Scott of Fargo, North Dakota, "to get rid of the Cyclops, say the name of the Greek hero made by Homer who put out the eye of a one-eyed giant in the *Odyssey*." To get through the invisible barrier of Hades, "ring the bell, light the candles with the matches from the dam, and read the book," Tim says.

To get a list of the 20 treasures, we had to turn to *The Book of Adventure Games*. (It's \$19.95 from Ar-rays, Inc./The Book Division; [213] 410-9466.) The treasures are: Beau-

tiful Painting, Jewel Encrusted Egg, Ivory Torch, Egyptian Sceptre, Pot of Gold, Crystal Skull, Jeweled Scarab, Large Emerald, Platinum Bar, Trunk of Jewels, Crystal Trident, Jade Figurine, Sapphire Bracelet, Huge Diamond, Bag of Coins, Silver Chalice, Clockwork Canary, Brass Bauble, and the Ancient Parchment.

Good luck! And let us know if you have any hints to share with other gamers. We pay hintsters like Tim Scott \$10 for each original hint or strategy tip we use. (But enough already, with the Zork hints! We're drowning in them!) THE EDITORS

DOCTOR KURSOR'S KLINIC

Is it a good idea to learn assembly or machine language?

DR. KURSOR: Most likely, you can happily live to a ripe old age without ever learning assembly or machine language. But many hackers who try it soon find they can't get enough!

BASIC makes programming easy. But M/L (that's what fans call machine language) releases the full powers of your computer. It lets you do things that *can't* be done in BASIC, plus M/L programs run much faster than BASIC programs.

Interested? Look for a good beginners' M/L book written for your particular machine. They're available for all popular computers.

You can start by figuring out short M/L routines on paper and then inserting them into your BASIC programs (see *this month's Computing Clinic* to find out how).

If you catch the M/L fever, eventually you'll want to buy an assembler. That's a program that lets you write M/L programs in assembly language—which looks a little more like English. For example, you can write JSR DRAW and the assembler program will translate it for you into something like 20 9F 2C.

What's the difference between serial and parallel?

DR. KURSOR: Serial and parallel are two different ways to do the same thing: transfer data. You may know that a disk drive is slower if it connects to a computer's serial port rather than having a parallel interface. But do you know why?

As far as computers are concerned, all information must be reduced to bits (that's ones and zeros—not smithereens!) to be transferred to or from a printer, modem, disk drive, or any other peripheral.

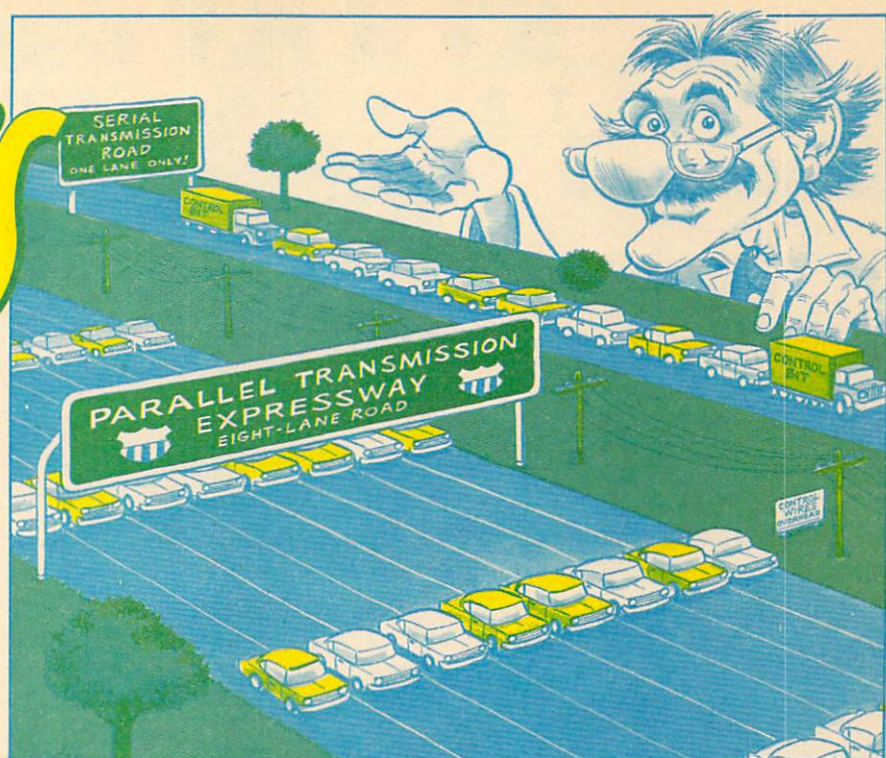


ILLUSTRATION BY SAM VIVIANO

The most common way of moving those bits is by serial transmission. Serial comes from the word series, meaning a succession of things coming one after another.

The bits of information are sent one at a time. Mixed in with these "data bits" are special "control bits" that help translate the data back into language the computer or other receiving device can understand. (See illustration.)

There are two ways of moving data through a serial port. Asynchronous, where the receiving and transmitting ends don't have to stay "in sync," is most common. When the computer or peripheral has something to say, it sends a control bit to announce that some data is on the way.

Then comes a series of bits (usually seven or eight), which represent a letter, number, or other character. Finally comes another control "message" to signal that that character is finished. Because of the control bits, a lot of extra information has to be sent along with the data.

In synchronous serial transmission, a control bit is sent to synchronize the sending and receiving ends, and then characters are sent in blocks one right after another, with no more control bits in between.

In parallel transmission, a number of bits can be sent at the same time. Usually the bits are sent in eight-bit groups—a byte at a time. Each bit travels down its own line in the connecting cable at the same time as (in "parallel" with) the other bits in the byte. (See illustration.) And there are extra lines in the cable to take care of control and synchronizing signals, so no control bits are needed.

So, in the time a serial connection can send eight data bits (one byte) and two control bits, a parallel connection operating at the same speed can send 10 whole bytes!

Obviously, parallel is much faster than serial. But it requires more expensive connecting lines and more complicated electronics at the receiving end.

It's also more difficult to keep the various signals synchronized, especially if they have to travel a ways. As a result, long-distance computer communication (New York to California, or even living room to bedroom) usually is done serially.

Need an answer to a hi-tech question?

Send your questions to Dr. Kursor's Klinik, c/o K-POWER, 730 Broadway, New York, NY 10003.

STRATEGY

TIPS, TRICKS, AND HINTS

DRAGONWORLD

Telarium Software. Graphic adventure. Your mission: To rescue, with the aid of the mysterious and stately Hawkwind, the Last Dragon from evil kidnappers. (Hints and game for Apple, C 64, IBM.)

- One of the action games, Bogs and Bats, has no effect on the plot itself and may as well be avoided. On the other hand, you must master the gambling game, Dragonstones, if you plan to increase your money supply.
- Don't bother trying to get Ephrion to say anything of importance; he speaks about as often as it



Leave no stone unturned, no character unquestioned in your crusade to rescue the last dragon.

snows on the sun. And what he says isn't particularly valuable.

- Always help those who are down on their luck.

Use the Dragonpearl to send you and your companions to a place of relative safety. Use it only in dire emergencies, when an Amsel's in distress. It's only good three (or five) times.

Listen to Hawkwind; his advice may seem insane, but it's usually on target.

The Kuln like their habitations to match their demeanor: very dark.

Some puzzles are meant not to be solved, like the maze of shrubbery and the swamp monster.

—CHARLES ARDAI, 14, New York, New York

RESCUE RAIDERS

Sir-tech Software. Strategy/arcade. Your mission: To reach and destroy the enemy time machine with your demolition truck in eight different battles; strategically deploy your forces and maneuver your helicopter around obstacles and enemy forces. (Hints and game for Apple.)

- Heat-seekers getting you down? The best way to avoid them is to fly to the top or the bottom of the screen and head away from them. When they get close to you, reverse direction and, if you're at the top of the screen, go down. If you're at the bottom, go up. Keep this up and soon the heat-seeker will run out of fuel and crash. Or, you can stay in one place and move up and down repeatedly. The heat-seeker

will burn up its fuel trying to match your altitude.

Here are two convoy formations that have proved very successful. The first is cheap, so you can deploy it often. The second, although more expensive, is extra effective.

1. Two tanks, followed by an anti-aircraft (AA) vehicle and finally a demolition van.

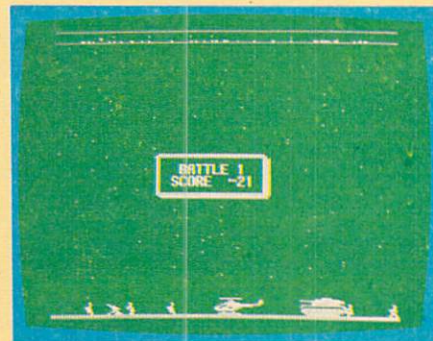
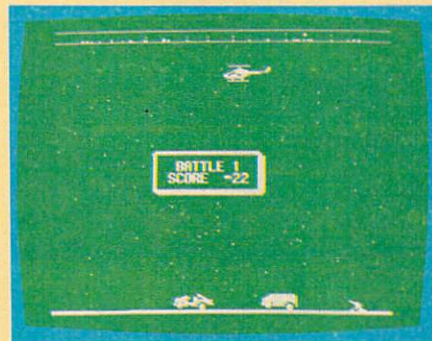
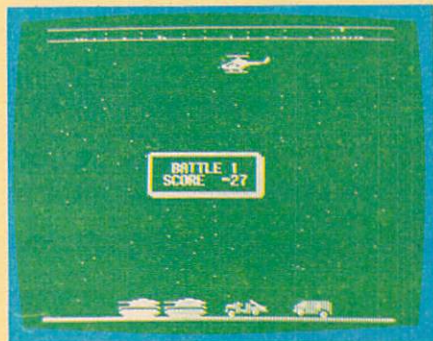
2. Two or three tanks, an AA-vehicle, followed by two vans with a tank, an AA-vehicle, and a van bringing up the rear.

- Keep the enemy helicopter away from your convoys as follows: Use heat-seekers to destroy the first two that appear. Then blast as many as possible by flying over them and bombing them. When you're out of bombs, wait for the enemy 'copter to come to you. When it tries to bomb

you, let it, and move forward a bit as each bomb is dropped. They'll all miss. After it has used up its bomb supply, it will retreat. Chase it and shoot it down. Repeat this as long as you have fuel to return home, and when the LOW FUEL sign flashes, turn around and head back to base to refuel.

Leave plenty of space between your AA-vehicles and your demolition vans. Sometimes when the AA-vehicle launches its missile and explodes, your van can be destroyed by the shrapnel.

Men are some of your most vital resources. Drop them off near an AA or anti-tank gun so they can destroy it. Use them to capture tank-destroying and machine-gun stocked bunkers. Whatever you do, don't forget to use them.—SPECIAL Ks



From left to right, three tactics to consider when taking on the terrorist forces in *Rescue Raiders*: 1) Start with two tanks, follow with an AA vehicle, then demo van; 2) Start with two or three tanks, two vans, an AA vehicle, then a van in the rear (the tail end is shown here); 3) Remember to use that manpower; it's a really valuable resource.

ZORK II and ZORK III

Infocom. Text adventure. Your mission: To explore the great underground empire of Zork, solving complex puzzles and collecting treasure in the process. (Hints and game for most computers.)

🔑 *Zork II.* Crystal is invisible in water.

🔑 *Zork II.* Fire and ice don't mix. Maybe you should lead one to the other.

🔑 *Zork II.* You'd do well to ponder this sentence for the answer to the riddle room.

🔑 *Zork II.* You can't push the button in the carousel room—maybe you can get something to do it for you.

🔑 *Zork II.* It might help to know a little about unicorns' characteristics; that will help you decide whose help to enlist.

🔑 *Zork II.* Before eating the cake, think about *Alice in Wonderland*. P.S. Avoid the orange cake.

🔑 *Zork III.* Murder doesn't pay and you'll find you have to trust many people. In the case of the hooded figure, only wound him.

🔑 *Zork III.* To get the key from the south shore, you'll need the grue repellent from the Scenic Vista. Be sure to get hold of it before the earthquake ruins the water tunnel.—CHARLES ARDAI, 14, *New York, New York*; BRUCE KAMIMURA, 14, *Richmond, B.C., Canada*; BLAKE LINDNER, 14, *Pinckeyville, Illinois*; MARK SUTER, 15, *Bulger, Pennsylvania*

H I N T H O T L I N E

NECROMANCER, Synapse Software. (C 64) Arcade/strategy. Your mission: To grow an army of trees and use them to destroy the enemy forces, ultimately to do battle with the enemy necromancer.

🔑 The best way to grow trees is first to plant one in each corner. When they mature, plant a group of trees between them. The outer, older trees will protect the inner, younger ones from the attacking trolls.

🔑 At the second set of screens, it may be easier to go straight down and proceed to the third set. But beware: You'll find that all the spiders you failed to kill on previous screens will appear now.—DAVID LANGENDOEN, 16, *Brooklyn, New York*

50 MISSION CRUSH, SSI. (Apple, Atari, C 64) Strategy/tactics. Your mission: To fly over German-occupied France in your *Flying Fortress* airplane and bomb strategic cities.

🔑 Fly diagonally over the anti-aircraft fields. This diminishes your vulnerability.

🔑 Always carry extra bombs. Your heavier load will burn more fuel, but if you use the bombs effectively, it will improve your score greatly.—SPECIAL Ks

SHATTERED ALLIANCE, SSI. (Apple, Atari) Strategy/tactics. Your mission: To put together an army and defeat the computer's, or your opponent's, enemy forces.

🔑 If possible, concentrate your attacks on weaker units, such as light infantry or cavalry. If you rout

these units quickly, you'll lower the morale of the army as a whole. Also, the more you rout, the easier it is to rout other units; it works like a chain reaction.

🔑 To rout the enemy, set your heavier units on some of the enemy's weaker ones, then cast haste spells on your unit at every turn. This way, at each turn you'll be attacking. Before long, the enemy will turn tail and flee.

🔑 Establish exactly what arms your opponent has; it's quite a shock to see half your medium cavalry decimated by the pikemen you'd thought were a bunch of wimpy infantry.—D. L.

SERPENTINE, Broderbund Software. (Apple, Atari, C 64, VIC-20) Arcade. Your mission: To use your snakes to rid the world of their evil cousins.

🔑 Get a snake to follow you, and when he makes a turn, double back and nail him.

🔑 Don't kill the last snake until you lay an egg (just cut him down to size). When doing this, stay as close to home as possible. This way, the frog won't have time to eat the egg while you can't defend it.—PETER COCKCROFT, 17, *New York, New York*

IMPOSSIBLE MISSION, Epyx. (Apple, C 64) Arcade/strategy. Your mission: To infiltrate the stronghold of Alvin, a mad professor, and reach his control room before he blows up the world. Collect pieces of a puzzle scattered throughout the rooms, and

put them together to gain entry.

🔑 Sometimes a gap actually may be too small to jump over. Don't worry, in these cases, you can just walk across the hole.—JEROME GOEMAAT, 12, *Bussey, Iowa*

BLADE OF BLACKPOOLE, Sirius. (Apple, Atari, C 64) Graphic adventure. Your mission: To venture forth in search of the Blade of Blackpoole.

🔑 The shield protects, but it weighs a lot and may slow you down.

🔑 Bees need honey and plants need bees.—DAMON OSGOOD, 16, *Brooklyn, New York*

ASYLUM, Screenplay. (Apple, Atari, C 64, IBM PC) Graphic adventure. Your mission: To escape the insane asylum where you're being held captive, before a maniac (who you alone can stop) destroys the world.

🔑 The janitor will take anything dropped in the halls. So, leave valuable stuff in empty rooms.

🔑 The baseball bat has many purposes; don't lose it.—STEVEN KADISH, 15, *Leonia, New Jersey*

We're looking for a few good hints! Help K-POWER readers be all that they can be by sending us hints for your favorite games. We have all the *Zork* and *Pac-Man* hints we can handle, but we'll be glad to publish and pay \$10 for hints we've not heard of. Send them to Hint Hotline, c/o K-POWER, 730 Broadway, New York, NY 10003. (Note: the computer systems listed in brackets indicate the computer versions the hints work for.)



MUSIC PROGRAMS BY JOEY LATIMER

Most programs change your computer keyboard into a piano keyboard that lets you play just one note at a time. This month's Microtones gives you something better! With this Fat Keyboard program, which I worked on with Technical Editor John Jainschigg, when you play one note—you get three or four! The notes can make up either a major, minor, or seventh chord, depending on which you select. The end result is (in record biz lingo) a real "fat" sound!



*on
disc
NDS
work
(iHic)*

ATARI/FAT KEYBOARD

```
10 DIM A(40),B(24),C(2,2),AS(16),QS(27),KS(3),SS(1),RS
(1),MS(1),LS(1)
20 LS=CHRS(153):RS=CHRS(25):MS=CHRS(252):SS=CHRS(32)
30 FOR I=1 TO 3:KS(I)=CHRS(160):NEXT I
40 ST=0:F=1:POKE 752,1:SETCOLOR 2,0,0
50 READ AS,QS
60 FOR I=0 TO 39:A(I)=-1:NEXT I
70 FOR I=0 TO 12:READ K:A(K)=I:NEXT I
80 FOR I=0 TO 24:READ N:B(I)=N:NEXT I
90 FOR I=0 TO 2:FOR J=0 TO 2:READ D:C(I,J)=D:NEXT J:NEXT
I
100 PRINT CHR$(125):POSITION 13,0:PRINT "*FAT KEYBOARD
*"
110 PRINT :PRINT
120 FOR V=1 TO 9:IF V=7 THEN SS=MS
130 PRINT " ";LS;KS;SS;KS;SS;KS;MS;KS;
140 PRINT SS;KS;SS;KS;SS;KS;MS;KS;RS
150 NEXT V
160 FOR I=5 TO 33 STEP 2:P=INT(I/2)-1
170 IF AS(P,P)<>"X" THEN POSITION I,8+F*4:PRINT AS(P,P)
)
180 F= NOT F:NEXT I
190 POSITION 4,18:PRINT "PRESS KEY ALONE FOR MAJOR CHO
RD,"
200 POSITION 8,19:PRINT "<SHIFT>+KEY FOR MINOR,"
210 POSITION 8,20:PRINT "<CTRL>+KEY FOR SEVENTH."
220 IF PEEK(753)=3 THEN 260
230 IF ST=0 THEN 220
240 ST=0:FOR I=0 TO 3:SOUND I,0,0,0:NEXT I
```

```
250 POSITION 15,15:PRINT " "GOTO 220
260 K=PEEK(764)
270 CT=(K>=64)+(K>=128)
280 K=K-CT*64-11:IF K<0 OR K>40 THEN 220
290 IF A(K)=-1 THEN 220
300 POSITION 15,15:PRINT QS(CT*9+1,CT*9+9)
310 SOUND 0,B(A(K)),10,4
320 FOR I=1 TO 3:SOUND I,B(A(K)+C(CT,I-1)),10,5:NEXT I
330 ST=1:GOTO 210
1000 DATA Q2W3EXRST6YUXIX
2000 DATA **MAJOR***MINOR***SEVENTH*
3000 DATA 36,19,35,15,31,29,18,34,16,32,40,0,2
4000 DATA 243,230,217,204,193,182,173,162,153
4010 DATA 144,136,128,121,114,108,102,96,91
4020 DATA 85,81,76,72,68,64,60
5000 DATA 4,7,12,3,7,12,4,7,10
```



COMMODORE 64/FAT KEYBOARD

```
10 DIM A(54),B(2,24),C(2,1)
20 RS=CHRS(146)+CHRS(161):LS=CHRS(18)+CHRS(161)
30 MS=CHRS(18)+CHRS(98):SS=CHRS(146)+CHRS(32)
40 KS=CHRS(18)+" "
50 SA=0:F=-1:S=54272
60 FOR I=0 TO 24:POKE S+I,0:NEXT I:POKE S+24,15
70 POKE S+5,79:POKE S+6,234:POKE S+12,79
80 POKE S+13,234:POKE S+19,79:POKE S+20,234
90 READ AS,QS
100 FOR I=0 TO 54:A(I)=-1:NEXT I
110 FOR I=0 TO 12:READ K:A(K)=I:NEXT I
120 FOR I=0 TO 24:READ B(1,I),B(2,I):NEXT I
130 FOR I=0 TO 2:FOR J=0 TO 1:READ C(I,J):NEXT J:NEXT I
140 POKE 53281,0:POKE 53280,0
150 PRINT CHR$(147):TAB(13):CHR$(150):"*FAT KEYBOARD*"
160 PRINT:PRINT:PRINT CHR$(5)
170 FOR V=1 TO 9:IF V>6 THEN SS=MS
180 PRINT " ";LS;KS;SS;KS;SS;KS;MS;KS;
190 PRINT SS;KS;SS;KS;SS;KS;MS;KS;RS
200 NEXT V
210 FOR I=5 TO 33 STEP 2:P=INT(I/2)-1
220 IF MID$(AS,P,1)="" THEN 240
230 POKE 214,8-F*4:PRINT:PRINT TAB(I):MID$(AS,P,1)
240 F=NOT F:NEXT I
250 POKE 214,18:PRINT
260 PRINT CHR$(150):" PRESS KEY ALONE FOR MAJOR CHOR
D,"
270 PRINT TAB(8):"<SHIFT>+KEY FOR MINOR,"
280 PRINT TAB(8):"<CTRL>+KEY FOR SEVENTH.":CHR$(158)
290 K=PEEK(197):IF K>=64 THEN 340
300 IF SA=0 THEN 290
310 SA=0:POKE S+4,32:POKE S+11,32:POKE S+18,32
320 POKE 214,15:PRINT:PRINT TAB(15):" "
330 GOTO 290
340 K=K-8:IF K<0 OR K>54 THEN 290
350 IF A(K)=-1 THEN 290
360 CT=-(PEEK(653)=4)-(PEEK(653)>=1)
370 POKE 214,15:PRINT:PRINT TAB(15):MID$(QS,CT*9+1,9)
380 POKE S+4,33:POKE S+11,33:POKE S+18,33
390 POKE S,B(2,A(K)):POKE S+1,B(1,A(K))
400 POKE S+7,B(2,A(K)+C(CT,0))
410 POKE S+8,B(1,A(K)+C(CT,0))
420 POKE S+14,B(2,A(K)+C(CT,1))
430 POKE S+15,B(1,A(K)+C(CT,1))
440 SA=1:GOTO 290
1000 DATA Q2W3EXRST6YUXIX
2000 DATA **MAJOR***MINOR***SEVENTH*
3000 DATA 54,51,1,0,6,9,8,14,11,17,16,22,25
4000 DATA 8,97,8,225,9,104,9,247,10,143,11,48,11,218
4010 DATA 12,143,13,78,14,24,14,239,15,210,16,195
4020 DATA 17,195,18,209,19,239,21,31,22,96,23,181
4030 DATA 25,30,26,156,28,49,29,223,31,165,33,135
5000 DATA 4,7,3,7,7,10
```




TI-99/4A/FAT KEYBOARD

```

10 DIM A(148,2),B(24),C(2,1)
20 CALL CHAR(128,"0000000000000000")
30 CALL CHAR(129,"1818181818181818")
40 CALL CHAR(130,"FFFFFFFFFFFFFFFF")
50 CALL CHAR(136,"F0F0F0F0F0F0F0F0")
60 CALL CHAR(137,"0F0F0F0F0F0F0F0F")
70 CALL COLOR(13,2,16)
80 CALL COLOR(14,1,16)
90 K$=CHR$(128)&CHR$(128)
100 M$=CHR$(129)
110 S$=CHR$(130)
120 L$=CHR$(136)
130 R$=CHR$(137)
140 OK=-1
150 READ A$
160 FOR I=0 TO 148
170 A(I,1)=-1
180 NEXT I
190 FOR I=0 TO 2
200 FOR J=0 TO 12
210 READ K
220 A(K,1)=J
230 A(K,2)=I
240 NEXT J
250 NEXT I
260 FOR I=0 TO 24
270 READ B(I)
280 NEXT I
290 FOR I=0 TO 2
300 FOR J=0 TO 1
310 READ C(I,J)
320 NEXT J
330 NEXT I
340 CALL CLEAR
350 PRINT TAB(8);"*FAT KEYBOARD*"
360 PRINT
370 FOR V=1 TO 9
380 IF V<>7 THEN 400

```

```

390 S$=M$
400 PRINT " ";L$;K$;S$;K$;S$;K$;M$;K$;
410 PRINT S$;K$;S$;K$;S$;K$;M$;K$;R$
420 NEXT V
430 FOR I=1 TO LEN(A$)
440 Z$=SEGS(A$,I,1)
450 IF Z$="X" THEN 470
460 CALL HCHAR(24+5*(ASC(Z$)<65),I+4,ASC(Z$))
470 NEXT I
480 PRINT
490 PRINT
500 PRINT TAB(12);"MAJOR"
510 PRINT TAB(12);"MINOR"
520 PRINT TAB(12);"SEVENTH"
530 PRINT
540 PRINT
550 PRINT " PRESS KEY ALONE FOR MAJOR,"
560 PRINT " <SHIFT>+KEY FOR MINOR,"
570 PRINT " <CTRL>+KEY FOR SEVENTH."
580 PRINT " (<ALPHA LOCK> MUST BE UP.)"
590 CALL KEY(S,K,S)
600 IF S=-1 THEN 590
610 IF OK=-1 THEN 650
620 CALL SOUND(-1,44733,30,44733,30,44733,30)
630 CALL HCHAR(15+OK,13,32)
640 OK=-1
650 IF S=0 THEN 590
660 K=K-35
670 IF (K<0)+(K>148) THEN 590
680 IF A(K,1)=-1 THEN 590
690 CALL HCHAR(15+A(K,2),13,42)
700 CALL SOUND(4250,B(A(K,1)),1,B(A(K,1)+C(A(K,2),0)),
1,B(A(K,1)+C(A(K,2),1)),1)
710 OK=A(K,2)
720 GOTO 590
1000 DATA QX2WX3EXXRSTX6YX7UXXI
2000 DATA 78,15,84,16,66,79,18,81,19,86,20,82,70
2010 DATA 46,29,52,0,34,47,2,49,59,54,3,50,38
2020 DATA 110,143,116,144,98,111,146,113,147
2030 DATA 118,148,114,102
3000 DATA 131,139,147,156,165,175,185,196,208
3010 DATA 220,233,247,262,277,294,311,330,349
3020 DATA 370,392,415,440,466,494,523
4000 DATA 4,7,3,7,7,10

```

M I C R O N O T E S

If you've really got rhythm, and a Commodore 64, this one's for you: **Sight & Sound's Kawasaki Rhythm Rocker** (\$34), a program written by jazz guitarist, composer, and recording artist Ryo Kawasaki. He's included lots of great electronic percussion and synthesizer sounds you can add to preprogrammed bass lines.

To get those music terms down, you might check out Sight & Sound's **3001 Sound Odyssey** (\$34) for the C 64. It teaches important electronic music-composition terms such as ADSR, waveform, filters, and ring modulation. The program includes the "Microsynth" synthesizer, which spruces up the rhythm patterns you record. Sight & Sound, 3200 S. 166th St., P.O. Box 27, New Berlin, WI 53151; (800) 558-0910.

Activision has gone into tune-making, too, with **The Music Studio** (\$29) for the C 64. The program's creative icons make writing, editing, and printing out music a breeze. Point to the ear icon to hear music; a note to see the music you play; the trash can to throw out music you're working on; and the instrument palette to select instruments and sound effects—you can write a chord to include up to three instruments. In no time at all you'll be a master of different keys and note lengths, and setting such details as waveforms,

pulse widths, resonance, and ring (vibration) modulation. Activision, 2350 Bayshore Frontage Road, Mountain View, CA 94043; (415) 960-0410.

Let **Covox's Voice Master** (C 64, \$90; Apple II/II plus/IIe, \$120 includes Sound Master interface board) make a maestro out of you. All you do is hum or whistle into the headphone mike, and watch the notes scroll by on a musical score on your screen. Turn to the EDIT mode to change or correct any of the notes, save the song to disk, and grab your musical score from the printer. Later on, you can go back to the PERFORMANCE mode to change octaves or musical keys, or add chords—all from the tune you hummed or whistled. Covox, Inc., 675-D Conger St., Eugene, OR 97402; (503) 342-1271.

Another way to get your Apple to talk, give off stereo sound effects, or make music is with the **Mocking-board** (\$99 to \$195) from **Sweet Micro Systems**. It comes in different versions: a sound and music synthesizer (A; \$99), a speech synthesizer upgrade unit that plugs into the music synthesizer (B; \$89), a combination stereo sound, music, and speech synthesizer (C; \$179), and the same combo for the Apple IIc (D; \$195). Sweet Micro Systems, 50 Freeway Drive, Cranston, RI 02920; (401) 461-0530.

—LINDA WILLIAMS

COMPU COPIA

PROGRAMS BY JOHN JAIN SCHIGG

APPLE/SHORT SUBJECTS

```
10 DIM B(7),A$(2,5,8)
20 FOR I = 0 TO 7:B(I) = 2^I:NEXT I
30 FOR J = 1 TO 2:FOR K = 1 TO 5:FOR L = 1 TO 8
40 READ V:A$(I,J,K) = "":FOR L = 7 TO 0 STEP -1
50 IF V >= B(L) THEN V = V-B(L):A$(I,J,K) = A$(I,J,K)+
  CHR$(127):GOTO 70
60 A$(I,J,K) = A$(I,J,K)+CHR$(32)
70 NEXT L,K,J:I=HOME
80 FOR CHAR = 1 TO 2:FOR CYCLES = 1 TO 10
90 P = 1:F = 1:FOR FRAME = 1 TO 8
100 VTAB 7:FOR LINES = 1 TO 8
110 HTAB 17:PRINT A$(CHAR,P,LINES):NEXT LINES
120 IF FRAME = 5 THEN F = -1
130 P = P+F:NEXT FRAME:NEXT CYCLES
140 HOME:FOR D = 1 TO 1000:NEXT D:NEXT CHAR:GOTO 80
1000 DATA 48,48,8,28,122,24,174,65
1010 DATA 24,24,8,28,60,24,28,100
1020 DATA 24,24,8,24,60,24,24,100
1030 DATA 48,48,8,30,122,24,174,65
1040 DATA 7,14,110,168,28,14,1,0
1050 DATA 0,0,111,172,28,14,1,0
1060 DATA 0,0,96,160,31,14,1,0
1070 DATA 0,96,160,28,30,17,12,0
1080 DATA 0,96,160,28,30,29,12,6
1090 DATA 0,96,160,28,30,29,12,6
```

IBM PCs/SHORT SUBJECTS

```
10 KEY OFF:WIDTH 40:DIM B(7),A$(2,5,8)
20 FOR I=0 TO 7:B(I)=2^I:NEXT I
30 FOR I=1 TO 2:FOR J=1 TO 5:FOR K=1 TO 8
```

```
40 READ V:FOR L=7 TO 0 STEP -1
50 IF V>=B(L) THEN V=V-B(L):TS=CHR$(219) ELSE TS=CHR$(
  32)
60 A$(I,J,K)=A$(I,J,K)+TS:NEXT L,K,J,I:CLS
70 FOR CHAR=1 TO 2:FOR CYCLES=1 TO 10
80 P=1:FOR FRAME=1 TO 8
90 FOR LINES=1 TO 8:LOCATE LINES+8,17,0
100 PRINT A$(CHAR,P,LINES):NEXT LINES
110 IF FRAME<5 THEN P=P+1 ELSE P=P-1
120 NEXT FRAME:NEXT CYCLES
130 CLS:FOR D=1 TO 600:NEXT D:NEXT CHAR:GOTO 70
```

After you have typed in the lines above, add lines 1000-1090 from the Apple version.

TRS-80 COLOR COMPUTER/SHORT SUBJECTS

```
10 CLEAR 1000:DIM B(7),A$(2,5,8)
20 FOR I=0 TO 7:B(I)=INT(2^I):NEXT I
30 FOR I=1 TO 2:FOR J=1 TO 5:FOR K=1 TO 8
40 READ V:A$(I,J,K)="" :FOR L=7 TO 0 STEP -1
50 IF V>=B(L) THEN V=V-B(L):TS=CHR$(128) ELSE TS=CHR$(
  32)
60 A$(I,J,K)=A$(I,J,K)+TS:NEXT L,K,J,I:CLS
70 FOR CHAR=1 TO 2:FOR CYCLES=1 TO 10
80 P=1:FOR FRAME=1 TO 8:PRINT@128,"";
90 FOR LNS=1 TO 8:PRINT TAB(12);A$(CHAR,P,LNS)
100 NEXT LNS:IF FRAME<5 THEN P=P+1 ELSE P=P-1
110 NEXT FRAME:NEXT CYCLES:CLS
120 FOR D=1 TO 600:NEXT D:NEXT CHAR:GOTO 70
```

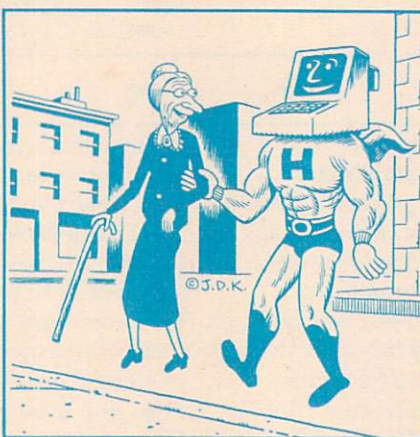
After you have typed in the lines above, add lines 1000-1090 from the Apple version.

HACKER HEROES CONTEST

K-POWER salutes whiz kid Peter Lepik! He's helping to give hacking a good name. Peter, 15, recently worked with police in Minneapolis, Minnesota, to help crack a case (or in this incident, crack some "locked" Radio Shack computer files thought to contain criminal evidence).

The police turned to Peter, who lives in a suburb of Minneapolis, when their own computer expert was stumped. The police computer specialist remembered Peter's escapades of a year before when Peter had honed his hacking skills by inadvertently tapping into a bank's computer using his Apple, modem, and scanning program. This time around Peter used his investigative computing on the side of the law and earned himself praise.

If you know of any computer users who are giving hacking a good name by doing especially positive things with their computers (or if you are), let us know. We're interested in "hacker heroes"—kids who're putting their computing to good use by



helping parents, teachers, their school, senior citizens, the handicapped, or their community.

Send us a description of the "hero" or "heroine" and what he or she is doing to give hacking a good name. K-POWER will read all entries and pick five to be published in a future issue.

"Heroes" will receive a \$25 prize and so will the "authors" of the entries.

Send to: K-POWER Hacker Hero Contest, c/o K-POWER, 730 Broadway, New York, NY 10003. Entries need to reach K-POWER by May 24, 1985.

My "hacker hero" is: _____ Age _____
 Address _____
 City _____ State _____ Zip _____
 Telephone () _____ Male _____ Female _____
 He or she gives computing a good name by _____

(Attach full explanation on separate sheet, please).

My name _____ Age _____
 Address _____
 City _____ State _____ Zip _____
 Telephone () _____ Male _____ Female _____

WHAT'S IN STORE

NEW HARDWARE ANNOUNCEMENTS*

COMPUTERS

Epson QX-16

MANUFACTURER: Epson America, Inc., 2780 Lomita Blvd., Torrance, CA 90505; (213) 539-9140

PRICE: Estimated at less than \$3,000

The keywords for the QX-16 are power and versatility. Epson's new 16-bit version of the QX-10 should spare the consumer many peripheral- and software-buying decisions. The QX-16 comes with 256K RAM (expandable to 512K); three operating systems (CP/M, MS-DOS, and TPM 3, which permits *Valdocs 2* to operate); two disk drives; and three expansion slots.

The accompanying *Valdocs 2* (on three disks) should cover most software needs. It includes a spreadsheet integrated with business graphics (to draw pie or bar charts), an indexed file manager, an address book, an enhanced word processor, a scheduler, and a telecommunications program. (Epson also markets an optional direct-connect modem.)

QX-10 owners, whose machines are equipped with the slower *Valdocs 1.18*, can purchase *Valdocs 2*



for less than \$50. Users can easily operate either version of *Valdocs* by choosing from clearly labeled function keys: PRINT, HELP, CALC, MAIL, etc.

The storage capacity of the dual 5¼-inch disk drives (a hard-disk drive is optional) varies: It's 360K in

**These products have been announced by manufacturers, but are not necessarily in the stores yet. Some products may still be under development, and others may be in test markets only. Call or write the manufacturer for expected date of delivery.*

the MS-DOS mode, and a full 720K in the CP/M mode. A 12-inch, high-resolution (640 × 400) monochrome monitor comes with the QX-16. Different type fonts and special graphics characters can be designed and displayed—an impressive feature. A hi-res color monitor is optional. Other features include a CMOS clock/calendar; a Centronics parallel interface; an RS-232 serial port; and an IBM PC video-emulation board for use with any software requiring an IBM monitor.

PRINTERS

Cardco MLQ/3, MLQ/1 Printers (for Macintosh)

MANUFACTURER: Cardco, Inc., 300 S. Topeka, Wichita, KS 67202; (316) 267-6525

PRICE: \$499 (MLQ/3); \$649 (MLQ/1)

Cardco has developed two letter-quality printers that interface with the Apple Macintosh, which has an unusual serial interface incompatible with most printers. Both Cardco printers have daisywheel and friction-feed mechanisms, with tractor-feed optional. The MLQ/3, with an 11-inch carriage, prints at 13 characters per second (cps); the 13-inch-wide MLQ/1 prints at 14 cps. Each printer also has a Centronics parallel interface, so they can connect with other printers.

Orbit XP

MANUFACTURER: Olympia USA, Box 22, Somerville, NJ 08876; (201) 722-7000

PRICE: \$459

From the West German typewriter manufacturer, Olympia, comes a new electronic model that doubles as a printer. The 10-character-per-second typewriter features a 20-character correction memory, three pitches (the number of characters per line), automatic centering, indent, underline, and decimal tabulation. A parallel interface port built into the Orbit XP permits it to interface with most personal computers. It prints bidirectionally, and weighs just over 16 pounds.

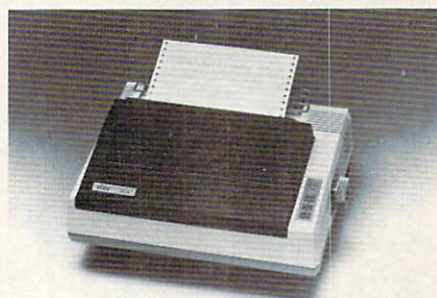
While typewriters that double as printers are an alluring product, be

sure to test them with your computer before you buy. Also, make sure your favorite software, especially any software that has print-formatting features, is supported by the typewriter/printer.

Star Micronics Printers

MANUFACTURER: Star Micronics Inc., 200 Park Ave., New York, NY 10166; (212) 986-6770

PRICE: \$299 (SG-10); \$499 (SG-15)



Star Micronics, which established itself with the low-cost STX-80 thermal printer and the Gemini series of workhorse dot-matrix printers, has introduced a new line of dot-matrix machines. Of these, the SG-10 and SG-15 are the least-expensive options for home users. The SG (Star Gemini) line will replace the Gemini line.

Both new models print in draft quality at 120 characters per second (cps) and 30 cps in the near-letter-quality mode. They allow for both friction and tractor feed, so that you can use either individual letterhead paper or fanfold computer paper. The printers support "high-resolution" bit-image graphics, and the graphics are designed to be compatible with the IBM PC and PCjr.

What accounts for the \$200 price difference between the two models is the number of columns and the buffer size (see more on "buffers" in the *Computing Clinic*). The SG-10 prints up to 80-, 96-, or 136-character lines, depending on pitch (half that in double-width characters), while the SG-15 offers up to 136-, 163-, and 233-character lines (again, half that in double width). In addition, the higher-priced model has a 16K buffer, enough to store about eight to 10 pages of text, allowing your computer to do other tasks while the printer is in operation. ➔



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.....H..	\$40	h \$26	Fast Load Cartridge (Epyx)
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.....IJ	\$150	h \$99	Home Act.Plus (Array/Con)
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.....I..	\$70	h \$45	Homeward (Sierra On Line)
ABCD.E.G.IJ	\$35	r \$23	Lode Runner (MAC \$27)
ABCD.E.G.IJ	\$40	e \$26	MasterType (MAC \$33)
ABC.E.G.IJ	\$50	e \$32	Math Blaster (Davidson)
ABC.E.G.IJ	\$25	e \$18	Memory Bldr:Concentration
.....E.G.IJ	\$40	r \$28	M.U.L.E. (Electronic Arts)
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ABC.E.G.IJ	\$40	r \$28	Murder on the Zimereuf
ABC.E.G.IJ	\$40	r \$28	Music Construction Set
ABC.E.G.IJ	\$50	eh\$33	Nursing. 64k (Great!)
ABC.E.G.IJ	\$40	r \$28	1 on 1: L.Bird & J.Erving
ABCD.E.G.IJ	\$40	r \$28	Pinball Construction Set
ABC.E.G.IJ	\$50	h \$32	Print Shop (Broderbund)
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ABC.E.G.IJ	\$40	e \$26	Spellcrafter (Designware)
ABC.E.G.IJ	\$40	r \$26	Summer Games (IBM Sept.85)
ABCD.E.G.IJ	\$35	r \$23	Transylvania (MAC \$27)
ABCD.E.G.IJ	\$40	r \$26	Trivia Fever. 48k (Prof'l)
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ABC.E.G.IJ	\$60	r \$39	Ultima II,III (each). 48k
ABC.E.G.IJ	\$50	e \$32	Word Attack (Davidson)
ABC.E.G.IJ	\$80	h \$52	Your Personal Net Worth
.....IJ	\$100	h \$65	Your Personal Net Worth
ABCD.E.G.IJ	\$45	r \$26	Zork 1,2,3. (each)
.....G.IJ	\$40	r \$26	Zork 1,2,3. (each)

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WHAT'S IN STORE NEW HARDWARE

MISCELLANEOUS

Computereyes (Apple)

MANUFACTURER: Digital Vision Inc., 14
Oak St., Suite 2, Needham, MA
02192; (617) 444-9040

PRICE: \$129

This new peripheral from Digital Vi-
sion allows you to transfer a video
image onto your Apple II plus or Iie
computer screen.

Computereyes connects between a
videotape recorder (VCR) or a video
camera and the computer. The scan-
ning device then produces a mono-
chrome image on the computer
screen in less than five seconds.
That image can be stored on disk, or
a printout can be made (if your
printer can print graphics).

Computer art, education, and en-
tertainment are some of the obvious
applications for the peripheral. Soft-
ware comes with the system, as does
an interface module, cable, and own-
ers' manual.



Epyx Fast Load Cartridge

MANUFACTURER: Epyx, Inc., 1043 Kiel
Court, Sunnyvale, CA 94089; (408)
745-0700

PRICE: approx. \$39

What Commodore 64 owner hasn't
complained about the Commodore
1541 disk drive's turtle-slow loading
time? Epyx should pacify these mal-
contents with its Fast Load Car-
tridge, an item that loads disks five
times faster and copies them at 10
times the speed. It plugs into the C
64's cartridge port and works with



the most popular software made for
the computer, Epyx says. The car-
tridge includes features for editing,
copying, and locking files, and a tool
for advanced programming in as-
sembly language.

General Electric Peripherals

MANUFACTURER: General Electric Co.,
Electronics Park, Syracuse, NY
13221; (800) 626-2000
PRICE: Printer (\$299); Modem (\$119);
TV/Color Monitor (\$489)



General Electric, maker of myriad
household products, has targeted a
new product category—computer pe-
riipherals. Following its successful
entree with a computer program re-
corder last year, GE now is mass
merchandising peripherals compati-
ble with Atari, Commodore, and IBM
computers.

The Model 3-8100 printer (\$299)
uses thermal-transfer technology,
the same method used by the Apple
Scribe and Okimate 10 and 20 color
printers. It has a parallel interface
built in, and optional interfaces
(\$89) are available for Atari, Commo-
dore, and IBM PCjr computers. Pa-
per choices include plain or thermal;
rolled, fanfold, or cut-sheet. It prints
in draft mode at 50 cps, and near-
letter quality mode at 25 cps—in
condensed, normal, and double-
width styles.

For people who need flexibility in
telecommunications, GE offers the
Model 3-8200 modem (\$119). It has
an acoustic coupler for use with
hard-wired phones (often found in
hotel rooms), and a direct-connect
jack for use with modular-plug
phone lines. When no AC power is
available, the 300-baud modem will
run on 9-volt batteries.

The modem comes with an
RS-232C interface; optional inter-
faces are available for Atari and Com-
modore (\$12).

Also in the lineup is a color moni-
tor that doubles as a TV—the 13-
inch model 13BC5509 (\$489). Un-

like some other combination TV/monitors, this model accepts standard composite video input (not RGB), and cannot display 80 characters of text clearly. However, the quality of the TV image is above average.

Lifestyle Personal Communicator

MANUFACTURER: AudioBionics, 9817 Valley View Road, Eden Prairie, MN 55344; (612) 941-5464 or (800) 328-4827, ext. 1400.

PRICE: \$1,795


AudioBionics' 18-ounce portable communications device for the speech or hearing impaired packs a lot of power. It's a combination voice synthesizer, computer terminal with 8K of user memory, telephone device for the deaf, scientific calculator, calendar, word processor, and alarm clock. It has a typewriter-style keyboard and a single-line LCD display (40 characters). All this in a truly pocket-size $8\frac{3}{4} \times 3\frac{1}{2} \times 1\frac{1}{4}$ -inches.

An important innovation for the speech impaired, the Communicator incorporates a preprogrammed voice synthesizer with a 1,777-word vocabulary that can be spoken. The user can store up to 253 messages in memory (the equivalent of eight typed pages), and the computer will spell out words that aren't stored, at three different speeds. It will speak messages as they're typed, often with a single keystroke (an advance

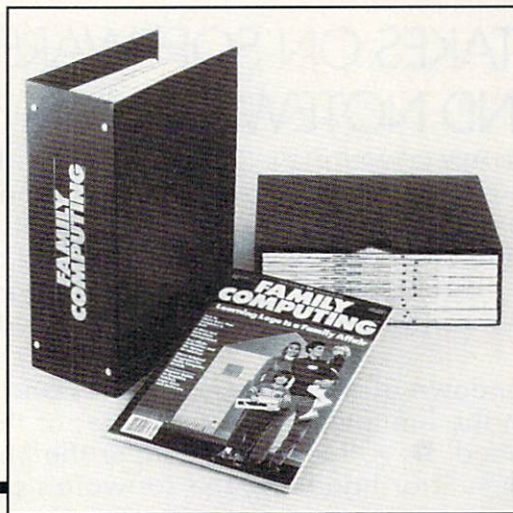


tage for persons with physical impairments), and can act as a phone-answering device.

A modem allows for two-way telephone communication with both TDDs, as well as regular computers that use the standard ASCII code. The Communicator has a built-in acoustic coupler—so it will even work at a pay phone or hotel room, where modular jacks aren't available. In addition, it has a modular phone jack.

The Lifestyle Personal Communicator can operate with rechargeable batteries. On one battery charge, the unit will operate in the communications mode for six to eight hours, and for 120 hours in nonvoice modes. 

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WHAT'S IN STORE

SOFTWARE REVIEWS

QUICK TAKES ON SOFTWARE— NEW AND NOTEWORTHY

Welcome to FAMILY COMPUTING's Software Guide, the most comprehensive listing available of two dozen of the newest, most noteworthy, and/or best programs on the market. Our reviewers include families from all over the country who have judged the software according to the following criteria: long-term benefits and applications, adaptability, and advantages of using a computer for a given task. Programs have been evaluated and rated for their performance in each of the categories listed below. More detailed reviews follow the chart.

Here's a rundown of the rating categories and what they mean: **O** = Overall performance, given the limitations and capacities of the particular computer for which the software is intended. **D** = Documentation, or the instructions and literature that accompany a program. **EH** = Error-handling, the software's capacity to accommodate errors made by the user—an especially important consideration with software for younger users. **PS** = Play system, in the games reviews, the quality of the game design and the game's playability. **GQ** = Graphics quality, also evaluated in light of each particular brand's graphics capabilities. **EU** = Ease of use after the initial learning period, which varies from computer to computer. **V** = Value for money, or how the software measures up to its price.

HOME BUSINESS/HOME MANAGEMENT

Title Manufacturer Price	Brief description	Hardware/ Equipment required	Backup policy	Ratings					
				O	D	EH	GQ	EU	V
THE DESK ORGANIZER Warner Software 666 Fifth Ave. New York, NY 10103 (212) 484-3070 \$195 ©1984	Keep track of appointments, perform calculations, jot down notes, telecommunicate, switching operations easily, using other programs (available memory permitting). Package best-suited for busy schedules, messy offices. —TAETZSCH	Reviewed on IBM PC/PCjr, 98K (d.). Planned for Mac.	90-day warranty.	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	E	★ ★ ★
DISCOVER YOUR BABY (Birth to Two Years) The BHT Group 883 Stierlin Road, B-200 Mountain View, CA 94043 (415) 853-1131 \$69 ©1984	Record your child's growth, special events such as first steps. Keep track of health records, and obtain hints of fun activities for you and your 1-month to 2-year-old baby.† —BUMGARNER	Apple II series, 48K (d.).	90-day warranty.	★ ★ ★ ★	★ ★ ★ ★	★ ★ ★ ★	★ ★ ★ ★	E	★ ★ ★ ★
FLEET SYSTEM 2 Professional Software, Inc 51 Fremont St. Needham, MA 02194 (617) 444-5224 \$79 w/spelling checker \$49 w/o spelling checker ©1984	Word-processing package with 70,000-word spelling checker handles most writing needs. Includes limited calculator and "extra text" area for notes or addresses that can be merged automatically to main text.† —ODISIO	C 64 (d.).	90-day warranty (includes user-damaged).	★ ★ ★ ★	★ ★ ★ ★	★ ★ ★ ★	N/A	A	★ ★ ★ ★
PC FILE Computer Easy 414 E. Southern Ave. Tempe, AZ 85282 (612) 829-9614 \$19 ©1984	That price is no typo. Record, find, update, sort, and print almost any kind of information—from addresses to inventory, health records, customer and club-membership lists. An all-purpose family file manager. —TAETZSCH	IBM PC/PCjr, 128K (d.).	30-day warranty (includes user-damaged); \$5 fee thereafter or for backup.	★ ★ ★ ★	★ ★ ★ ★	★ ★ ★ ★	★ ★ ★ ★	E	★ ★ ★ ★

RATINGS KEY O Overall performance; D Documentation; EH Error-handling; GQ Graphics quality; EU Ease of use; V Value for money; ★ Poor; ★★ Average; ★★★ Good; ★★★★ Excellent; @ ★★★ to ★★★★ depending on price; N/A Not applicable; E Easy; A Average; D Difficult; † Longer review follows chart

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Adam

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EDUCATION/FUN LEARNING

Title Manufacturer Price	Brief description	Hardware/ Equipment required	Backup policy	Ratings					
				O	D	EH	GQ	EU	V
BANK STREET MUSIC WRITER Mindscape 3444 Dundee Road Northbrook, IL 60062 (312) 480-7667 \$49 ©1984	Enter music in three parts; edit and play back with versatile music processor. Print out and even check compositions for time-signature accuracy. Good for musicians and non-musicians alike.† —BUMGARNER	Reviewed on C 64 (d.). Also for Atari Home Computers, 48K (d.).	90-day warranty.	★ ★ ★ ★	★ ★ ★ ★	★ ★ ★ ★	★ ★ ★ ★	A	★ ★ ★ ★
BASIC BUILDING BLOCKS MECA 285 Riverside Ave. Westport, CT 06880 (800) 631-6322 \$79 ©1984	A gentle, patient guide to the use, syntax, and command vocabulary of BASIC. Interactive tutorial gives rules and examples for beginners and near-beginners. Also use to debug programs. —WILSON	Reviewed on Apple II series, 64K (d.). Also for Atari Home Computers, 48K (d.); IBM PC/PCjr, 128K (d.).	90-day warranty; \$5 fee thereafter or if user-damaged.	★ ★ ★ ★	★ ★ ★ ★	★ ★ ★ ★	★ ★ ★ ★	E	★ ★ ★ ★
BELOW THE ROOT Windham Classics 1 Kendall Square Cambridge, MA 02139 (617) 494-1200 \$26 ©1984	Pick one of five characters and adventure through the world of <i>Green Sky</i> . Based on the children's trilogy, this package encourages note-taking, exploring, and mapping.† —SUMMERS	Reviewed on C 64 (d.). Also for Apple II series, 48K (d.). Planned for IBM PC/PCjr. Joystick for C 64.	90-day warranty.	★ ★ ★ ★	★ ★ ★ ★	★ ★ ★ ★	★ ★ ★ ★	E	★ ★ ★ ★
DESIGNER'S PENCIL Activision 2350 Bayshore Frontage Rd. Mountain View, CA 94043 (415) 960-0410 \$24 (Atari); \$34 (C 64); \$39 (Apple, IBM) ©1984	Adults, and older children will enjoy creating graphics, and adding musical accompaniment. Use a joystick to choose commands from an on-screen menu.† —BYRNE	Reviewed on C 64 (d.). Also for Apple II series, 48K (d.); Atari Home Computers, 48K (cart.); IBM PC/PCjr, 128K (d.). Joystick.	1-year warranty.	★ ★ ★ ★	★ ★ ★ ★	★ ★ ★ ★	★ ★ ★ ★	E	★ ★ ★ ★
MANY WAYS TO SAY I LOVE YOU CBS Software One Fawcett Place Greenwich, CT 06836 (203) 622-2500 \$29 ©1985	Simple graphics and music combine in a message-making package that encourages kids (ages 4-8) and parents to communicate with one another.† —BUMGARNER	Reviewed on C 64 (d.). Also for Apple II series, 48K (d.).	90-day warranty; \$5 fee thereafter or if user-damaged.	★ ★ ★ ★	★ ★ ★ ★	★ ★ ★ ★	★ ★ ★ ★	E	★ ★ ★ ★
MICKEY'S SPACE ADVENTURE Sierra Inc. P.O. Box 485 Coarsegold, CA 93614 (209) 683-6858 \$39 ©1984	Find pieces of a shattered memory crystal, aided by Mickey Mouse and Pluto. Kids on the young side of 7-12 travel through the solar system, learning planets, mapping, and reasoning skills. —FRANK	Reviewed on Apple II series, 64K (d.). Also for C 64 (d.). Planned for IBM PC/PCjr.	90-day warranty; \$5 fee thereafter.	★ ★ ★ ★	★ ★ ★ ★	★ ★ ★ ★	★ ★ ★ ★	E	★ ★ ★ ★
MR. PIXEL'S PROGRAMMING PAINT SET Mindscape 3444 Dundee Road Northbrook, IL 60062 (800) 221-9884 \$34 ©1984	Use icons to pick functions in graphics program with many special features, including "zoom," which lets you see how pixels are used to draw on screen. Good for adults, teens, and kids over 10. —BYRNE	Reviewed on C 64 (d.). Also for Apple II series, 48K (d.); IBM PC/PCjr, 64K (d.).	90-day warranty.	★ ★ ★ ★	★ ★ ★ ★	★ ★ ★ ★	★ ★ ★ ★	A	★ ★ ★ ★
SKY TRAVEL: A WINDOW TO OUR GALAXY Commodore 1200 Wilson Drive West Chester, PA 19380 (215) 431-9100 \$34 ©1984	Map the skies. Change time of day and date and see how the heavens change. Zero-in on constellations, stars, and planets to learn more about them. For ages 12+. —CSANYI	C 64 (d.). Joystick optional.	90-day warranty; \$15 fee thereafter or if user-damaged.	★ ★ ★ ★	★ ★ ★ ★	★ ★ ★ ★	★ ★ ★ ★	E	★ ★ ★ ★
STORY MAKER: A FACT AND FICTION TOOL KIT Scholastic Software 730 Broadway New York, NY 10003 (212) 505-3567 \$39 ©1984	Story-processor lets kids stamp add text in different styles, and even print out their creations. Good creative activity for kids as young as 6 (with adult help). Best for ages 10+.† —BUMGARNER	Apple II series, 64K (d.) / IIc, 128K (d.). Joystick, mouse, or KoalaPad.	90-day warranty.	★ ★ ★ ★	★ ★ ★ ★	★ ★ ★ ★	★ ★ ★ ★	A	★ ★ ★ ★
SWISS FAMILY ROBINSON Windham Classics 1 Kendall Square Cambridge, MA 02139 (617) 494-1200 \$26 ©1984	Computerized version of the classic adventure tale encourages kids to make maps, take notes, solve puzzles, and read. Good family fun, for ages 10+. —SUMMERS	Reviewed on C 64 (d.). Also for Apple II series. Planned for IBM PC/PCjr.	90-day warranty; \$5 fee thereafter.	★ ★ ★ ★	★ ★ ★ ★	★ ★ ★ ★	★ ★ ★ ★	A	★ ★ ★ ★

RATINGS KEY O Overall performance; D Documentation; EH Error-handling; GQ Graphics quality; EU Ease of use; V Value for money; ★ Poor; ★★ Average; ★★★ Good; ★★★★ Excellent; @ ★★ to ★★★★★ depending on price; N/A Not applicable; E Easy; A Average; D Difficult; † Longer review follows chart

GAMES REVIEWS BY JAMES DELSON

Title Manufacturer Price	Brief description	Hardware/ Equipment required	Backup policy	Ratings					
				O	D	PS	GQ	EU	V
BANK PRESIDENT Infoware Corp. 2407 12th Ave. S. Nashville, TN 37204 (800) 325-8774 \$74 ©1984	Complex financial simulation makes you and up to nine other players bank presidents. Issue loans, invest in CDs, real estate, and more to make your bank the most profitable. For ages 14+.	IBM PC/PCjr (DOS 2.0, 2.1), 128K (d.).	90-day warranty.	★ ★ ★ ★	★ ★ ★ ★	★ ★ ★ ★	★ ★ ★ ★	D	★ ★ ★ ★
C'EST LA VIE Adventure International P.O. Box 3435 Longwood, FL 32750 (800) 327-7172 \$34 ©1984	Steer your character through a maze, picking up money to invest. Avoid tax collector and robbers in this cute <i>Pac-Man</i> /Monopoly hybrid. Fun for ages 8+, and adults, too.	Reviewed on Apple II series, 48K (d.). Also for Atari Home Computers, 48K (d. and cart.). Joystick optional.	1-year warranty (includes user-damaged); \$5 fee thereafter.	★ ★	★ ★	★ ★	★ ★	A	★ ★
CLEAR FOR ACTION Avalon Hill 4517 Harford Road Baltimore, MD 21214 (301) 254-5300 \$25 (cass.); \$30 (d.) ©1984	Exciting naval simulation set in the great Age of Sail. Take on single or multiple ships, steer, change sail configuration, board ships, and fire a variety of artillery. Use built-in ships or create your own.	Reviewed on Atari Home Computers, 48K (d. and cass.). Also for TRS-80 Models I/III (cass.). Joystick for Atari.	Unlimited warranty.	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	A	@
DRAGON'S LAIR Coleco Industries 999 Quaker Lane S. West Hartford, CT 06110 (203) 725-6660 \$39 ©1984	Easy-to-play home version of interactive videodisc arcade game. Survive traps and battle to progress through adventure to rescue princess; for ages 10+.	Coleco ADAM (data pack). Joystick.	90-day warranty.	★ ★	★ ★	★ ★	★ ★	A	★ ★
FIELD OF FIRE Strategic Simulations, Inc. 883 Stierlin Road., Bldg. A-200 Mountain View, CA 94043 (415) 964-1353 \$39 ©1984	Lead a company of men through a series of W.W.II battles, from North Africa to the Battle of the Bulge. Various levels of difficulty, character growth, and other extras make for one of the year's best; for ages 12+.	Reviewed on Atari Home Computers, 48K (d.). Also for C 64 (d.). Joystick.	30-day warranty; \$10 fee thereafter.	★ ★ ★ ★	★ ★ ★ ★	★ ★ ★ ★	★ ★ ★ ★	A	★ ★ ★ ★
GEMSTONE WARRIOR Strategic Simulations 883 Stierlin Road., Bldg. A-200 Mountain View, CA 94043 (415) 964-1353 \$34 ©1984	Venture through a labyrinth in search of fragments of a magic gem. Use crossbow, "grenades," and a variety of magic objects to fight hordes while mapping your way in fast-moving, arcade/role-playing game.	Reviewed on Apple II series, 48K (d.). Also for C 64 (d.). Joystick optional.	30-day warranty; \$10 fee thereafter.	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	A	★ ★ ★
PITSTOP II Epyx 1043 Kiel Court Sunnyvale, CA 94089 (408) 745-0700 \$29-\$35 ©1984	Steer your car through six different courses or drive the Grand Prix circuit against human or computer opponents. Various levels of difficulty and superb graphics make for best driving game ever. For ages 8+.	Reviewed on C 64 (d.). Also for Apple II series, 48K (d.); Atari Home Computers, 48K (d.); IBM PC/PCjr, 128K (d.). Joystick.	30-day warranty; \$10 fee thereafter.	★ ★ ★ ★	★ ★ ★ ★	★ ★ ★ ★	★ ★ ★ ★	A	★ ★ ★ ★
RENDEZVOUS EduWare 28035 Dorothy Drive Agoura Hills, CA 91301 (818) 706-0661 \$39 ©1982	Inventive, vivid simulation of space-shuttle launch, flight, orbit, and mission. Use mathematical and scientific skills and learn to fly the miracle of the '80s. For ages 12+.	Reviewed on Apple II series, 48K (d.). Also for Atari Home Computers, 48K (d.). Joystick for Atari.	90-day warranty; \$12 fee thereafter or if user-damaged.	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	A	★ ★ ★
TIMESHIP—MURDER AT THE END OF TIME Five Star Software P.O. Box 631 Elk Grove Village, IL 60007 (312) 952-8088 \$44 ©1984	Create a team of 1-4 characters; arm and equip them; send them through time to solve a mystery, finding clues, and fighting battles. Intriguing, though tough adventure/role-playing for advanced adventurers, 12+.	Apple II series, 48K (d.).	30-day warranty; \$5 fee thereafter; \$10 fee for backup.	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	D	★ ★ ★
TROLLS AND TRIBULATIONS Creative Software 960 Hamlin Court Sunnyvale, CA 94089 (408) 745-1655 \$24 (Atari, C 64); \$34 (Apple) ©1984	As a troll out for an afternoon of treasure-hunting, cretin-shooting, and adventuring, you run, jump, bounce, and shoot your way from level to level. Delightful arcade game for ages 8+.	Reviewed on C 64 (d.). Also for Atari Home Computers, 48K (d.). Planned for Apple II series.	90-day warranty (includes user-damaged).	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	E	★ ★ ★

RATINGS KEY O Overall performance; D Documentation; PS Play system; GQ Graphics quality; EU Ease of use; V Value for money; ★ Poor; ★★ Average; ★★★ Good; ★★★★ Excellent; @ ★★★ to ★★★★ depending on price; N/A Not applicable; E Easy; A Average; D Difficult; † Longer review follows chart

WHAT'S IN STORE

SOFTWARE REVIEWS

On the following pages, you'll find in-depth reviews of some of the programs listed in the Software Guide. Refer back to the Guide on page 76 for information such as backup policies and addresses of software manufacturers.

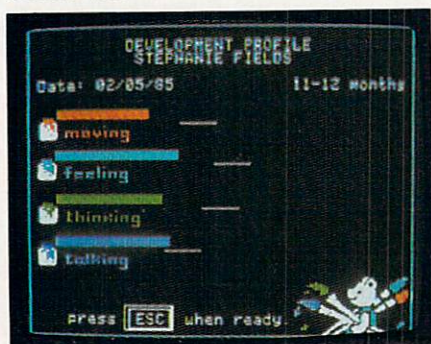
HOME BUSINESS/ HOME MANAGEMENT

Discover Your Baby

HARDWARE REQUIREMENTS: Apple II series.

MANUFACTURER: The BHT Group

PRICE: \$69



The era of the electronic baby book has arrived. With this program you can record everything your child says or does between the ages of 1 month to 2 years, as well as keep track of immunization dates and rate of growth.

Parents may use the "Journal" to record special memories for later reminiscing. Extra-special events, such as first steps or first words spoken, can be recorded and printed out in certificate form in the "Milestones" section, along with pages from the journal entries.

The heart of *Discover Your Baby*, however, lies not in the baby book features, but in its "Steppingstones" chapter. Your answers to a series of questions about your baby—"DOES SHE BABBLE AND COO?" "HAS SHE TURNED OVER?"—are read into memory and composed into a personalized profile. The profiles correspond to activities recommended in the accompanying hardcover book. They are intended to enhance your time with your baby and contribute to his or her early learning.

Our baby, Deborah, is my fourth child, so many of the play suggestions aren't new to me. But I think new parents will appreciate having these hints to go on. Don't let the growth comparisons that plot your child's emotional, social, physical,

and intellectual development scare you or encourage you to push your child. Use them to ascertain where your child may need a little help, or to alert you to sudden weight loss or gain.

The program and accompanying documentation stress positive ways of interacting with your baby. The computer isn't turned into a punitive, testing device.

A few limitations might trip up the new user. There are only 24 sessions provided and you must record your child's development regularly, once a month. You can catch up if you start when she's several months old, but you'll miss out on activities and stages if you skip a month. You can't enter information more than once a month, either. Also, once you've saved information in the "Steppingstones" or "Milestones" sections, you can't make changes.

As a baby book, this package may be a bit overpriced. As a minicourse in child development, and as a computerized activity book for parents and their new arrivals, it's worth a look.

—MARLENE ANNE BUMGARDNER

Fleet System 2

HARDWARE REQUIREMENTS: Commodore 64.

MANUFACTURER: Professional Software

PRICE: \$79

How many times has this happened to you? You've just word processed, edited, and polished a business letter or school paper. You slip your expensive bond paper or stationery into your printer, begin the printing process, and find, to your dismay, that you've typed a "D" for an "S" and concluded your letter "Dincerely, Norma." *Fleet System 2*, with its 70,000-word spelling checker, should help you avoid the trouble.

One of *Fleet System 2*'s more helpful features is the use of two separate text-editing areas. You can work on a letter or report, and switch to an alternate screen that might contain a paragraph you want to insert somewhere or extra notes you must refer to. You could be processing a club newsletter and use the extra text file as a sort of mailing list. By inserting "variable blocks" into the main text, you can merge the addresses from the mailing list into the letters.

Besides the word-processing standards, the copy, search, replace, and center-text capabilities, the package lets you add and subtract columns

of numbers with a built-in calculator. It lets you underline, boldface, and superscript text for footnotes or chemical formulae. All these features, plus the spelling checker, which permits you to add your own words to the dictionary, make for a comprehensive, complex package.

Be prepared to spend some time acquainting yourself with *Fleet System 2*. I would have preferred documentation that allowed you to get right into the program without having to read, read, read. As with anything else—playing the piano, driving a car—eventually the commands become second nature.

Fleet System 2 should take care of any student's word-processing needs. If your work or hobby calls on you to produce clean documents, perhaps newsletters or reports, this package is worth further examination.

—NORMA ODISIO

EDUCATION/FUN LEARNING

Bank Street Music Writer

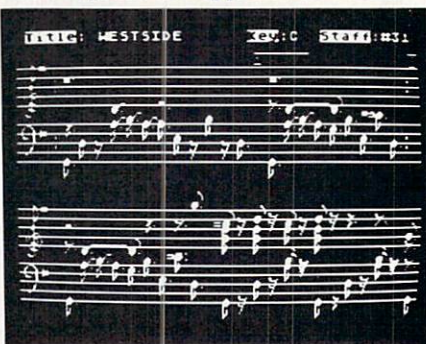
HARDWARE REQUIREMENTS: Reviewed on Commodore 64. Also for Atari Home Computers.

MANUFACTURER: Mindscape

PRICE: \$49

MANUFACTURER'S SUGGESTED AGE: 9+

If your children ever struggled with piano practice, trying to remember how a piece is supposed to sound



("It looked so easy when Mrs. Atkinson played it!"), they'll welcome *Bank Street Music Writer*. It's a music processor that lets you enter notes by placing the cursor at the correct line on the on-screen staff. You can play back the music and edit it, just as you'd edit a paper on your word processor.

You don't need to be a musician to use *Music Writer*, although songwriters will find it convenient for many reasons, e.g.: its printing feature, which prints out sheet music

for compositions you've entered, and its ability to automatically transpose music into another key. Novices who don't read music can enter notes, copied from a songbook or pamphlet, in as many as three voices (four on the Atari). If you sing in a choir, for instance, you could type in the music, then play it back for accompaniment! A feature will check your creations to make sure they fit the time signature you designated.

You'll need a few hours to get settled with *Music Writer*. Although suggested for ages 9 and up, it proved quite tough for our 9-year-old. For the most part, the manual is helpful, if occasionally sketchy on some of the program's capabilities. The COPY command, for instance, was not documented adequately. We had problems using it until we learned you must copy music at the beginning, not the middle, of a staff.

Nevertheless, we found this a remarkably powerful, versatile program, one we'll use to learn more about music for a long time.

—MARLENE ANNE BUMGARDNER

Below the Root

HARDWARE REQUIREMENTS: Reviewed on Commodore 64. Also for Apple II series. Planned for IBM PC/PCjr. Joystick for C 64.

MANUFACTURER: Windham Classics
PRICE: \$26

MANUFACTURER'S SUGGESTED AGE: 10 +

There's a new trend in computer games—adventures based on books. This is one of the best. In *Below the Root*, an adaptation of Zilpha Keatley Snyder's *Green Sky Trilogy*, you must free the hero, Raamo, from an underground prison. You needn't have read the books to play, but the game is so good it sent our kids scrambling to the library.

You play one of the series' five main characters (with the attributes assigned them in the book). Some start out physically strong, others have more "spirit strength." The longer you survive, the more robust you become. If you grow enough in spirit, you can eventually teleport objects and make trees grow. It's fun to try different characters and strategies, playing again and again.

Lovely melodies combine with beautifully crafted screens to recreate the world of Green Sky. Use the joystick to guide your character up tree and down limb. Glide from branch to branch if you have a



shuba—a winged garment. The enclosed map of the central paths, house, and shops will get you started. It's up to you to map and explore the uppermost branches and the mysterious passages below ground. A joystick-activated menu handles other commands like TAKE, BUY, and SPEAK. No need to type them—a good feature for early readers.

Our young adventurers learned that good manners are important in Green Sky. You can't take or use anything not offered to you. Being sensitive to others' feelings elicits the most helpful hints from characters you may encounter.

We played as a family, with someone mapping, someone keeping track of clues, and everyone taking turns at the joystick.

—TAN A. SUMMERS

Designer's Pencil

HARDWARE REQUIREMENTS: Reviewed on Commodore 64. Also for Apple II series, Atari Home Computers, IBM PC/PCjr. Joystick.

MANUFACTURER: Activision
PRICE: \$24 (Atari); \$34 (C 64); \$39 (Apple/IBM)

MANUFACTURER'S SUGGESTED AGE: 10 +

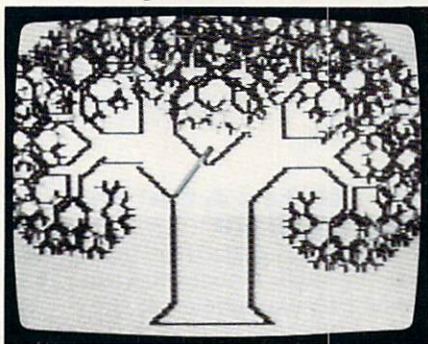
One glimpse of the hi-res graphics and music masterpieces promised on the *Designer's Pencil* box and a new user might confuse it with a machine language for computer whizzes. Not so! Our family plunged right in, using our joystick to pick out commands from a list of possibilities. We created, if not masterpieces, at least interesting pieces right away.

After 20 minutes with the package, a fledgling designer created a program that drew concentric circles accompanied by a three-part harmony. The listing looked like it had been created by a pro. Commands were chosen simply by placing the cursor over menu selections and pressing the joystick button. In-

creasing or decreasing the radius of a circle, using different colors, and changing other values were accomplished by moving the joystick forward or backward. "Loops" and "condition statements" (standards in the programmer's bag of tricks) were inserted with ease.

This package is tough to peg. It's a graphic-design package, and it executes music, too. It's got a bit of the introductory programming feel to it. Like Logo, exact instructions are required to create desired effects. This makes kids experiment with commands and results. Unlike Logo, there's no long list of commands to remember.

Print out the program listings or the designs themselves and send them to Activision. It's sponsoring a contest for the best short and long designs in two different age groups. Whether your household is made up of beginners or whiz kids, or both, *Designer's Pencil* is an entertaining, worthwhile pastime. —BETSY BYRNE



Many Ways to Say I Love You

HARDWARE REQUIREMENTS: Reviewed on Commodore 64. Also for Apple II series.

MANUFACTURER: CBS Software
PRICE: \$29

MANUFACTURER'S SUGGESTED AGE: 4 +

The familiar faces and friendly music of "Mr. Rogers' Neighborhood" made this package an instant hit with our almost-5-year-old daughter, Jamie. Using just the function keys, space bar, and RETURN key, she can paste stickers—little graphic illustrations—onto the screen, select a short greeting like "I LOVE YOU" or "WHAT A DAY," type in a few words of her own, add some music, and animate her message.

Having finished her card, Jamie "mails" it. "Wrapped" in an envelope, it remains on-screen with a trolley, waiting for the recipient to push the

WHAT'S IN STORE SOFTWARE REVIEWS

space bar. The trolley chugs across the screen and Jamie's message is unveiled—complete with animated characters, a bike-riding postman, and King Friday, for instance.

After one session with Mr. Rogers' message-maker, Jamie could create her own cards. She didn't mind the fact that the programs wouldn't actually print out her creations, although others may miss not having something to tape to the refrigerator to show for their efforts. All mes-



sages are given and received over the computer. Our family enjoyed using the computer to send cards to one another. I think of this package as a great piece of love-processing software. —MARLENE ANNE BUMGARNER

Story Maker: A Fact and Fiction Tool Kit

HARDWARE REQUIREMENTS: Apple II series. Joystick, mouse, or KoalaPad.
MANUFACTURER: Scholastic
PRICE: \$39
MANUFACTURER'S SUGGESTED AGE: 8+

Blank sheets of paper and blank computer screens sometimes can be mighty tough obstacles in the creative process. *Story Maker* is a story processor that remedies "imagination blocks" by providing a huge bank of ideas in the form of prepared illustrations. You can stamp them on the screen and then type in accompanying text in a variety of different styles and shapes. Print them out to create your very own customized storybooks.

Stables of clever pictures include everything from trolls to flamingos and motorcycles. These give kids a place to start when composing stories. First they can paste pictures randomly; then they can elaborate their creations with their own drawings and text.

Story Maker is simple to use. Icons (pictures) at the bottom of the screen indicate the program's vari-



ous functions. My son John loves to stamp illustrations all over the page by repeatedly pressing the joystick fire button. He can choose two sizes, flip the image, and erase the last one he stamped. With the hefty bank of illustrations provided, we had plenty of plot material.

One note: Be sure to prepare a data disk before creating a page of your story. There's no way to stop and format a disk after you've started without losing your work. Also, the mouse is preferable to the joystick as a pointing device. It gives the storyteller more control.

All in all, this is a wonderful tool, perfect for inspiring creativity in kids age 6 and up.

—MARLENE ANNE BUMGARNER

GAMES

Bank President

HARDWARE REQUIREMENTS: IBM PC/PCjr.
MANUFACTURER: Infoware Corp.
PRICE: \$74
CRITIC'S SUGGESTED AGE RANGE: 14+

This complex financial simulation makes 1–10 human or computer players bank presidents. Starting out with about \$1 billion to invest, you have a variety of ways to enrich your assets and turn your institution into the most successful commercial bank.

In each turn (equivalent to three months' real time), you can view your position in the market, review your decisions for the previous quarter, and alter your income-generating methods. Try issuing loans; investing in CDs, real estate, and other areas. Be as adventurous as funds permit, take your company public, force others off the market, or even give the little guy a break and cut interest rates.

Bank President is a superb game,

a sophisticated business simulation that requires no previous knowledge of the field in order to play.

Not for those who shy away from serious games, *Bank President* nevertheless features several options that will allow beginners to take on more experienced players. Don't let its 64-page documentation scare you. Start up the program, using the on-screen menus to play as far into the game as you can. Refer to the manual if you run up against any trouble.

Not since Strategic Simulations' (SSI) *Rails West!* have playtesters so enjoyed a financial simulation. It doesn't have the double-dealing and takeover bids of *Rails West!*, but it does generate great graphics and charts.

Clear for Action

HARDWARE REQUIREMENTS: Reviewed on Atari Home Computers. Also for TRS-80 Models I/III. Joystick.
MANUFACTURER: Avalon Hill
PRICE: \$25 (cassette); \$30 (disk)
CRITIC'S SUGGESTED AGE RANGE: 12+



Huge wooden ships, some with crews of over 1,000 men, sailed the seas in the late 18th and early 19th centuries, spreading the imperial power of the United States, France, England, and other European countries to the shores of every continent except Antarctica. When their interests collided, nations set sail to fight it out on the high seas. *Clear for Action* features 12 such battles, including one huge scenario with up to eight players controlling a ship in the Battle of Trafalgar.

If you like sailing and adventure, this new ship-building and sea-fight simulation is what you've been waiting for. Re-enact historic battles or create your own.

Choose one of the 56 ships included in the game's inventory or design your own vessel. Then match your craft against the computer or another

er player. Choose a set of sails, set your course, fire broadsides, and reload your guns. Reorganize your men on the ship, engage in hand-to-hand combat, and periodically get a full report on the ship's condition.

Clear for Action is different from Strategic Simulations' sailing-battle game on a number of counts. In SSI's *Broadsides*, different teams all move and fire simultaneously. Not so in *Clear for Action*. Play proceeds turn by turn so the player going second has a clear advantage since he or she is able to see how the opponent intends to move. This problem can be remedied by having players alternate at the keyboard, keeping their moves secret until battle. Also, *Broadsides*' ship-building mechanism is more flexible than that of *Clear for Action*.

Still, *CFA* was well-received by playtesters. We enjoyed being able to debate tactics and strategy instead of rushing into the thick of battle.

Field of Fire

HARDWARE REQUIREMENTS: Atari Home Computers. Also for Commodore 64. Joystick.

MANUFACTURER: Strategic Simulations
PRICE: \$39

CRITIC'S SUGGESTED AGE RANGE: 12 +

One of last year's most exciting games was *Operation Whirlwind*, a real-time simulation of World War II combat on the Eastern Front. *Whirlwind*'s author, Roger Damon, has outdone himself with this new game, *Field of Fire*. More complex than its predecessor, with more features to enjoy—including unit leaders with identifiable personalities, and the option to choose between small- or large-scale campaigns—*Field of Fire* is one of the best games and the best simulation of combat to date.

You take on the computer, either solo or with other players controlling different units. The encounters recreate American campaigns in North Africa, Sicily, France, and Germany. Different scenarios involve different numbers of units, from platoons all the way to the full company. Mount an intelligence-gathering raid on a town; undertake a cautious, but tenacious fight along a mountain road; or cross the Ruhr river into Germany. There are a variety of engagements to choose from.

In each scenario you can adjust the difficulty level and the enemy's



strength. Thus, beginners can advance and learn more sophisticated techniques as they play.

One of the game's best features is that each unit leader has a different character, which may affect his response and actions during the course of battle. Some squads have heroic leaders, others mere glory-seekers. This contributes enormously to the game's realism. You can even rename the leaders, if you like, and watch as they develop character traits on the basis of their performance in battle.

Gemstone Warrior

HARDWARE REQUIREMENTS: Reviewed on Apple II series. Also for Commodore 64. Joystick optional.

MANUFACTURER: Strategic Simulations
PRICE: \$34

CRITIC'S SUGGESTED AGE RANGE: 10 +

Here's a joystick-operated arcade role-playing adventure well worth the effort it requires to learn. A solo player maneuvers a character through a series of scrolling screens, gathering treasure and magic items, fighting assorted meanies, trying ultimately to collect the five pieces of a powerful gemstone scattered throughout a labyrinth.

Controlling the hero through joystick and keyboard, you can fire crossbows or throw grenades, use a variety of magic items to enhance your abilities or eliminate the enemy, pick up and drop items, and move. Unlike most role-playing adventures, the game's a fast-moving one, with an urgency that makes sense in this kind of expedition.

Don't count on a quick victory. In order to survive long enough to gather the shards of the crystal, you must master the control system. That will take hours of playing time. We had to stick with it for 11 or 12 hours before we managed to stay alive longer than a couple of screens.

Mapping is also crucial if you hope to have any chance of winning.

You have a number of magic items at your disposal including poison-, and invisibility-, protection-, and even annihilation-spells (the latter killing everything on the screen but yourself). You can partially heal yourself, heal completely with a regeneration spell, cure sickness with a book of prayer, and fall back on a mysterious set of unexplained items (dice, dagger, computer disks, and more), which may or may not help you.

All in all, this is a fairly fun game that should tide fantasy role-playing adventurers over until the publication of *Wizardry IV* and *Ultima IV*, expected soon.



Pitstop II

HARDWARE REQUIREMENTS: Reviewed on Commodore 64. Also for Apple II series, Atari Home Computers, IBM PC/PCjr. Joystick.

MANUFACTURER: Epyx
PRICE: \$29-\$35

CRITIC'S SUGGESTED AGE RANGE: 10 +

This is the best driving game I've seen so far. Using a joystick, one or two players steer through six different courses or drive the entire Grand Prix circuit. Choose from a variety of track lengths and difficulty levels (based on driving conditions). If and when you need a tire replacement or fuel-up, drive off the road into your pitstop and have the pit crew change your blackwalls and fill your tank.

Spending hours in front of the monitor in rapt involvement, playtesters voted this one of the year's best so far. Their hands tired from constant joystick action, as many of them stayed up all night to beat the computer. The animated graphics and excellent play system impressed everyone. Few games have elicited such an overwhelmingly favorable response.

—REVIEWS BY JAMES DELSON

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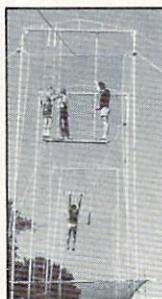
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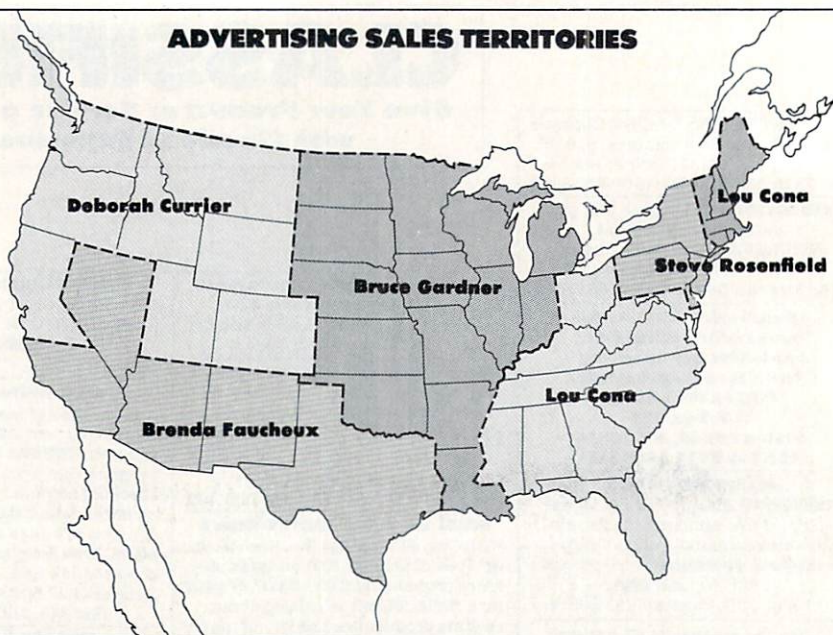
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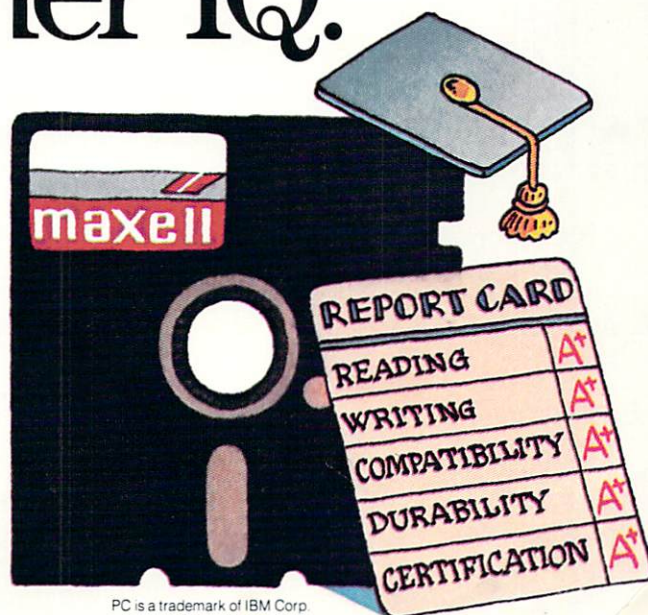
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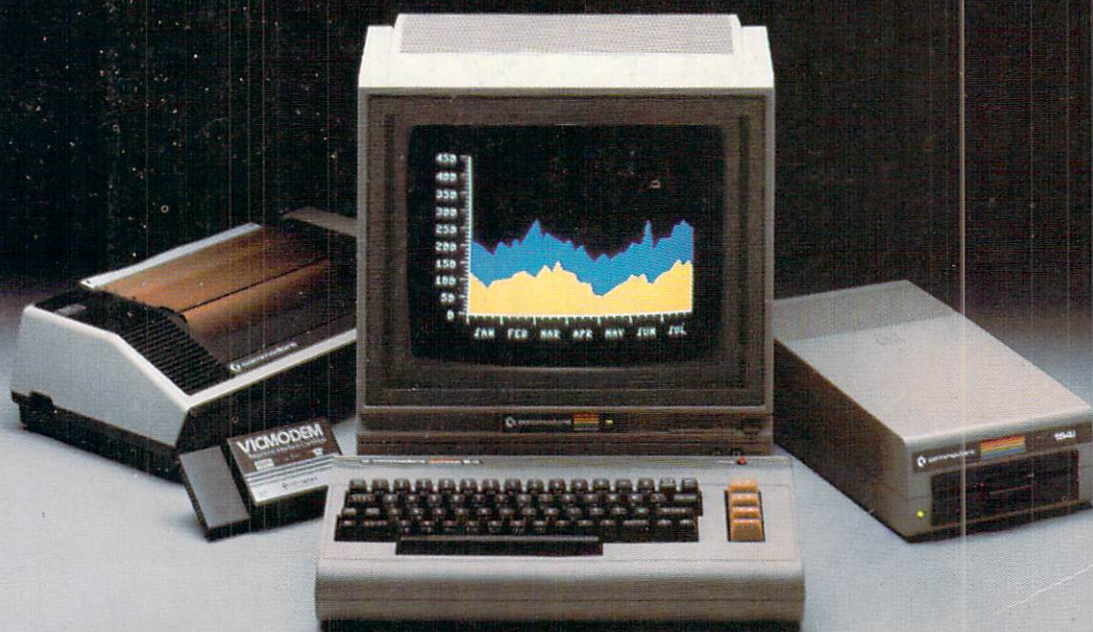
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